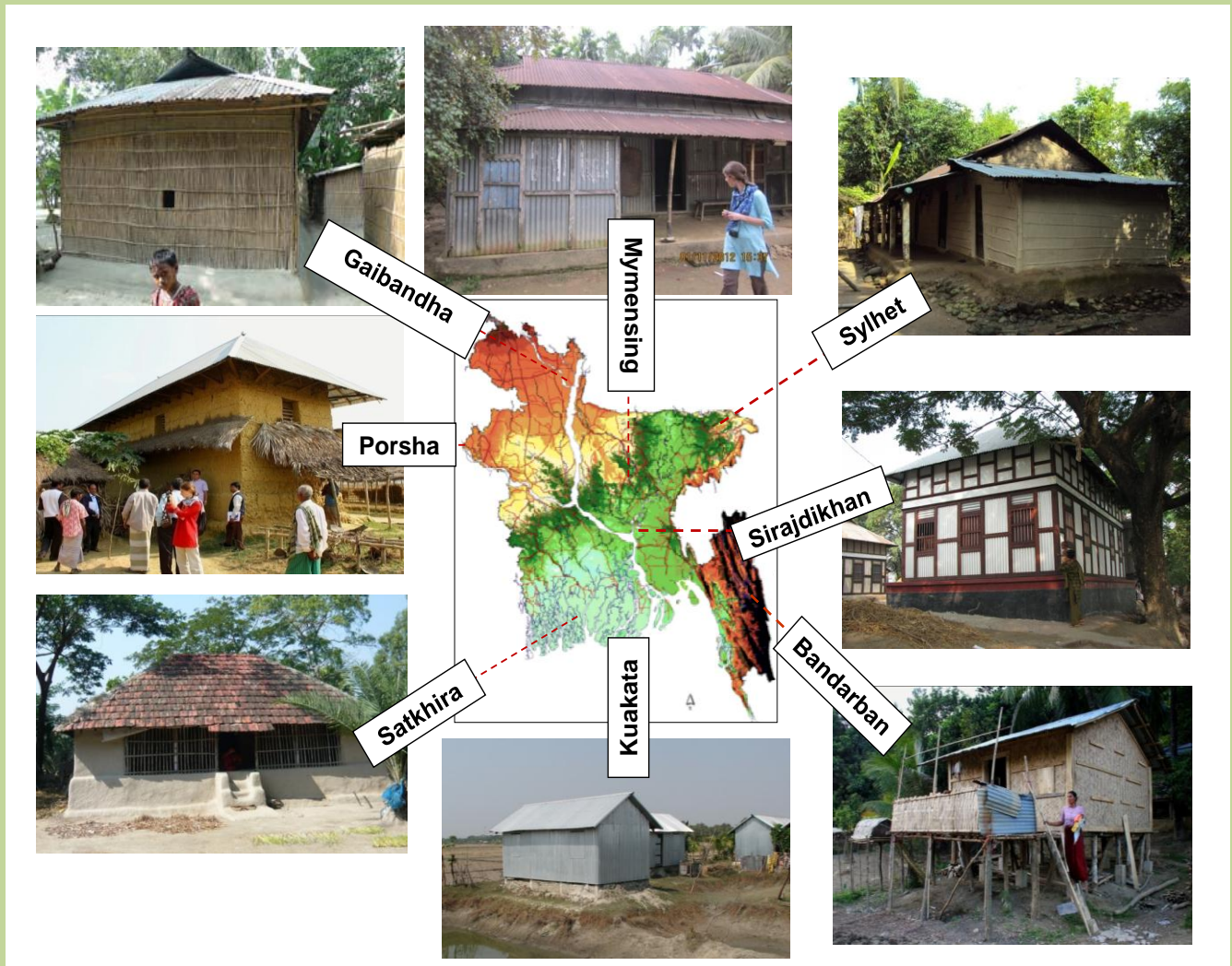


# Development of Disaster Resilient Affordable House Design for Different Regions of Bangladesh



Prof. Dr. Mohammad Shariful Islam  
Prof. Dr. Tahsin Reza Hossain



Department of Civil Engineering  
Bureau of Research Testing and Consultation (BRTC)  
Bangladesh University of Engineering and Technology (BUET)  
Dhaka, Bangladesh



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## Contact

Prof. Dr. Mohammad Shariful Islam

Cell: +880-171 330 1392

E-mail: [msharifulislam@ce.buet.ac.bd](mailto:msharifulislam@ce.buet.ac.bd), [msharifulbd@gmail.com](mailto:msharifulbd@gmail.com)

## Prepared by

Dr. Mohammad Shariful Islam and Dr. Tahsin Reza Hossain  
Department of Civil Engineering, BUET, Dhaka-1000

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## Graphics design

Engr. Farnia Nayar Parshi

## Research Assistant

Engr. Farnia Nayar Parshi





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June, 2017

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## Summary

Natural disasters- flood, cyclonic tidal/storm surge, land slide, river bank erosion, drought and earthquakes are the main hindrance to the sustainable development of Bangladesh. In recent years, these have caused extra burden for the marginal people of the country jeopardising country's economic growth as a whole. Although it is a small country, its culture, disaster types, availability of building materials are diverse and the housing practices in different regions vary widely too. A large number of rural houses are damaged due to disaster on a regular basis and cause economic losses and sufferings to the people. Repetitive constructions of such houses also impart deterioration of the environment as much of the construction materials are obtained locally from surrounding nature and thus sustainable development is also hampered significantly. The past experiences on post-disaster shelter response have emphasised the need for more contextual approaches to develop disaster resilient low-cost rural houses. Based on lessons learnt from shelter response after Sidr 2007 and Aila 2009 cyclones, Caritas Bangladesh took an initiative jointly with BUET, Bangladesh and CRAterre-ENSAG of France to develop design of disaster resilient low-cost houses involving local communities. Also, attention was given to develop design of houses that can be built quickly after a disaster. To this context, a seven year project is being carried out in eight different geographic regions of Bangladesh. To develop the design, at first the local practices and availability of local materials were studied. Besides, it was considered essential to understand and accommodate the need and culture of the community. At the same time it is important to consider environmental issues. Three-stage community level meetings attended by people, leaders and local masons were held to gather their views, demand and experience. Properties of the local construction materials were ascertained from laboratory tests. Respecting local affordability and considering the service and environmental loads, designs were finalized based on FEM analyses. Model houses were constructed at the selected locations to demonstrate them to the local community with an aim that new design or at least some features would be replicated. Different treatment schemes for increasing the durability of materials were employed to study their effectiveness. Thirty five designs have been developed in this research for eight different geographic regions of Bangladesh which will be useful for any individual, the Government and NGOs for constructing disaster resilient sustainable rural houses. Performances of these model houses are being monitored. The designs have been found to be accepted by the local community and some features are already replicated.

*Keywords:* Building culture, community participation, disaster resilient, local material, rural housing, sustainable development

## 1. Introduction

Bangladesh is considered to be one of the most disaster prone countries in the world due to its geographic location and socio-economic condition of people. Common disasters of Bangladesh are flood, cyclonic tidal surge, land slide, river bank erosion, drought and earthquakes. About 50% of the land is within 6-7m above Mean Sea Level, MSL (DMB, 2008) and thus the country remains very vulnerable to flood and cyclone.

House is one of the basic needs of human beings. It is a pity that majority people of Bangladesh live in non-engineered (83%, BBS, 2011) and unhygienic housing. The main cause of substandard housing is poverty. Majority of these houses are damaged due to disasters on a regular basis and cause the most economic losses during disasters (DMB, 2008). In recent years, frequent disasters have caused extra burden for the marginal people of the country and jeopardizing its economic growth as a whole. At the same time, the environment is also under threat as people are compelled to live in disaster-prone areas and damaging the surrounding natural resources. For example, in Kuakata and in Bandarban, people are using timber and bamboo from nearby forest and damaging the eco-system. In Kuakata, local people are procuring timber and thatch from nearby mangrove forest and thereby damaging the natural protection belt against cyclone.

Although it is a small country, its culture, disaster, availability of building materials are diverse and the housing practices are also widely varied. After a disaster event, Government and NGOs provide housing to the disaster affected people. Some are very costly and strong enough and some are very nominal and temporary. However, constructions of these houses often do not respect local culture and sometimes constructed in highly vulnerable locations. After the construction of external agency led houses, it is rare that the community replicates the same design. In 2007, a super cyclone Sidr (velocity= 242 km/hr and storm surge height= approx. 5m) passed through Bangladesh coast and damaged lots of houses. In response to that cyclone many houses also were constructed by the Government and NGOs. However, as can be seen from the photograph of the Figure 1 that many houses were constructed in paddy field which lacks both local practice and technical knowledge. This also imparts damages to the agricultural land and causes threat to the food security of the country.

Different international guidelines are available for a number of years (Seraj and Ahmed, 2004; Ahmed, 2005; Sadeq et al., 2008). At the same time there is a lot to learn from existing vernacular houses even they lack technical adequacy. A question may naturally be asked: why are these not being followed in practice? The answer is that R&D does not focus enough on local practice and that the fruits of existing R&D are not being transferred into the field as these houses are mostly designed and built by owners or masons who do not have access to these booklets. Current codes (BNBC, 2006) also do not have provisions for disaster resistant rural house design. There is a gap among the responding agencies for not having an effective design and technology for the construction of low-cost housing (LCH). At the same time, each of the community has their own construction techniques and materials for LCH. Some of them are very effective and scientific. These are sometimes overlooked during the construction of LCH. There is also a gap in understanding the local knowledge for having effective design and technology for the construction of LCH. Obviously, there is a necessity for bridging these gaps by learning from the people and then, transferring backs the improvement to them. Input of local people, local masons, local building culture and environment should be considered for sustainability. To this context, a seven year project has been completed in two phases.



**Figure 1.** Constructed houses by NGOs in paddy field after the cyclone Sidr 2007

## 2. Background and Objectives of the Project

Caritas Bangladesh (CB), as a human development organization has been constructing shelters i.e. Low Cost Houses (LCH) for disaster-affected families since 1970. As on June 2015, CB provided shelter support for 444,644 families all over the country. However, types of hazards are different and the people have cultural distinctions in different regions. Even in the same region, the culture may vary in different groups of people.

Moreover, the natural resources are specific from one site to other; therefore, the coping strategies for shelter should not be same. Previously one particular model house design was prepared by CB for all areas of Bangladesh. Some modifications were done from time to time. Disaster, geographical area, cultural aspects were also considered in some cases. Community people's opinions were sometimes taken into considerations for design of houses. But these were not adequate. Similarly Caritas Bangladesh constructed LCHs in Sidr 2007 affected areas having financial support from Secours Catholique/Caritas France. An evaluation was carried out in 2008 by International Centre for Earth Construction (CRAterre)-ENSAG for Caritas France supported houses. In the evaluation report, it was recommended that both the social and technical features of such houses should be improved. To this context, CB approached BUET to provide technical assistance towards their LCH Project in disaster-prone areas. CRAterre-ENSAG, France as a consultant to Caritas France also joined to provide technical support.



**Figure 2.** Different types of houses constructed in the same area by different agencies after Cyclone Sidr 2007

Upon successful completion of the CB implemented first phase of pilot LCH project in 2009-2010 Fiscal Year in Cyclone prone area Kuakata of Patuakhali and Flood prone area Sirajdikhan of Munshiganj district with financial support from Caritas France, CB took up its second phase (October 2011- March 2015) for other six regions of Bangladesh with funding support of Caritas France and Caritas Luxembourg wherein CRAterre-ENSAG and BUET are the technical partners for the project. Findings of the evaluation for first phase Pilot LCH Project done in collaboration with BUET and CRAterre-ENSAG have been considered for the second phase project. The main objective of the project is to minimize the impact of recurrent disasters on LCH by developing more disaster resilient design. In total, 35 types of LCH have been designed for 8 regions; at the same time 60 pilot LCHs have

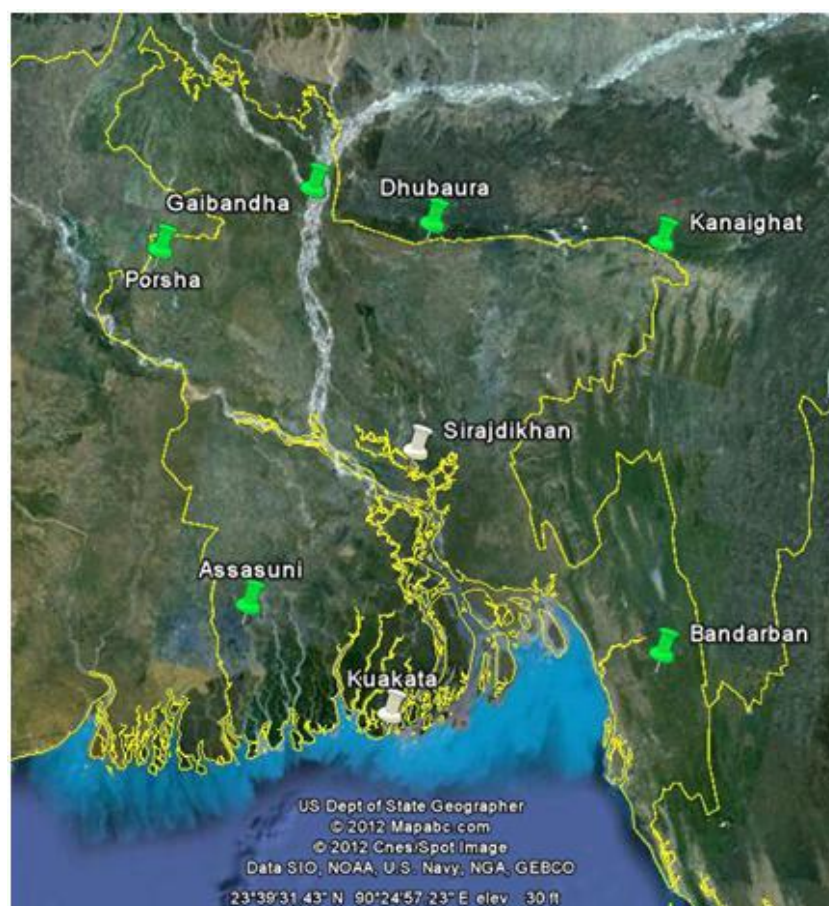


been constructed and 48 existing houses were repaired. The developed designs are given in the report (Islam and Hossain, 2015). Finally, the learnings are being disseminated to the rural people, engineers, other NGOs and educators (Islam et al., 2013; Moles et al., 2013; Moles et al., 2014). This current paper presents the findings of the project.

Based on the lessons learnt in the first two phases, guidelines are being developed for different stakeholders in the third Phase of the Project (January 2016-December 2016).

### 3. Project Locations

The project has been completed in two phases. At the first and second phases of the project, two and six regions were selected, respectively. Project locations are marked on Bangladesh map as presented in Figure 3. Name, disaster vulnerability and brief description of the locations are presented in Table 1. In the first phase, designs were developed for Kuakata and Sirajdikhan. In the second phase, designs were developed for Gaibandha, Mymensingh, Sylhet, Naogaon, Satkhira and Bandarban. Besides these major regions, designs were developed also for other 12 disaster prone areas: Birganj, Chirirbandar, Kalmakanda, Durgapur, Kulaura, Tahirpur, Puthia, Tarash, Shyamnagar, Rampal, Anowara and Pekua.



**Figure 3.** Project locations of the two phases shown on the map of Bangladesh

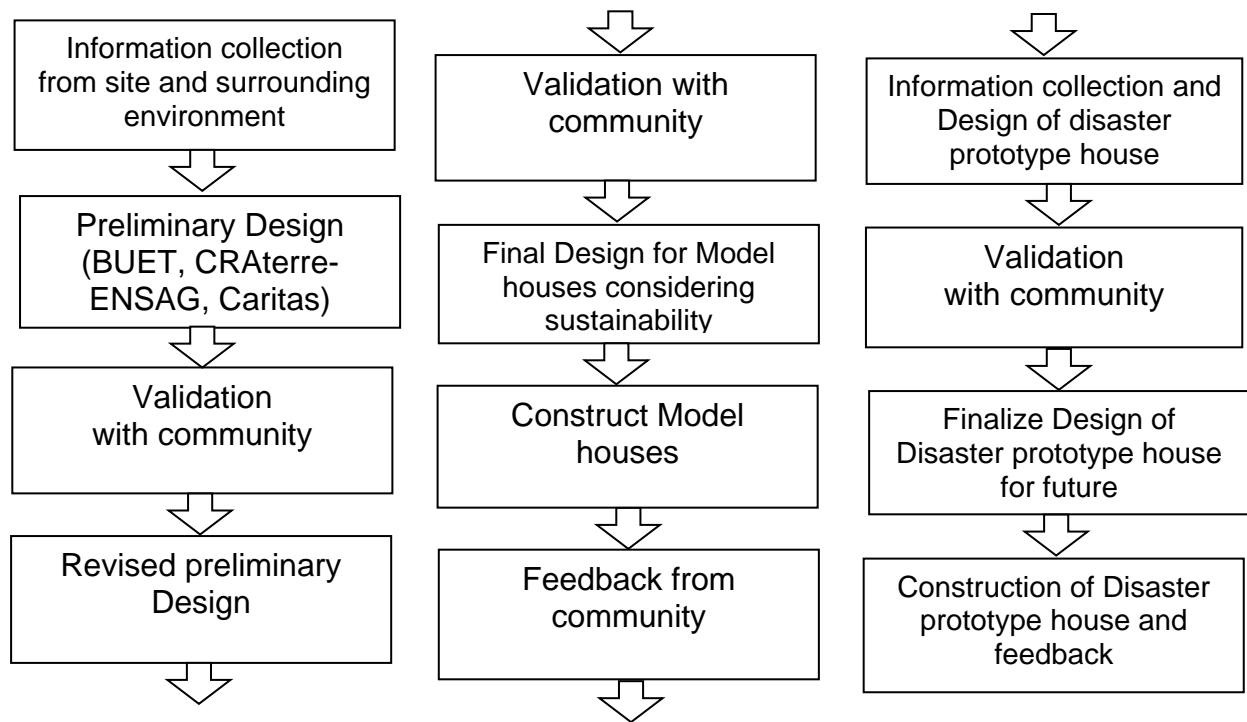
**Table 1: Description of Project Regions and House Types Designed in Phase I and Phase II**

Phase	Regions	Disaster vulnerability	Geographic description	Features of houses
Phase-I	Kuakata, Patuakhali	Cyclone, storm/tidal surge	Flat coastal land near Bay of Bangle	RC and bamboo post, timber roof, bamboo thatch fence and CGI sheet roofing. Wind resistance improved by providing bracings.
	Sirajdikhan, Munshiganj	Flood	Low-lying flood prone area of Ichhamati river	RC and bamboo post, timber roof, bamboo thatch fence and CGI sheet roofing. High plinth, wind resistance, loft for living during flood.
Phase-II	Gaibandha	Flood and river bank erosion	Brahmaputra river bank	RC and bamboo post, timber roof, two part fence-bamboo thatch at top and thin CGI sheet at bottom. CGI sheet roofing. Easy to dismantle and reconstruct.
	Dhubaura, Mymensingh	Flash flood	Flood plain of river Nitai	RC and bamboo post, timber roof, two part fence-bamboo thatch at top and thin CGI sheet at bottom. CGI sheet roofing.
	Kanaighat, Sylhet	Flash flood	Flood plain of river Surma	RC and bamboo post, timber roof, half mud wall at bottom and <i>lkor</i> thatch fence at top, CGI sheet roofing. Improved plinth, use of local stone.
	Porsha, Naogaon	Drought and earthquake	<i>Barind</i> Tract terraced land	Thick mud wall, timber roof truss, CGI sheet roofing. Stabilized mud, incorporation of bamboo reinforcement for ductility. Another type- <i>tati</i> wall house.
	Assasuni, Satkhira	Cyclone and flood	Coastal saline zone	RC and bamboo post with mud wall, roof with clay tiles on timber truss. High plinth, stabilized mud, wind resistance.
	Bandarban	Land slide	Hilly region	RC <i>katla</i> and timber post, timber roof, bamboo thatch fence and CGI sheet roofing, <i>machan</i> house, house on ground. Optimum use of timber, treatment of timber, lateral stability using bracing.

#### 4. Design Strategies and Project Sequence

Project sequence has been presented in Figure 4. Three-stage community level meetings were held to collect local information and views of the people along with the masons. Properties of the local construction materials of some regions were ascertained from laboratory tests. Considering sustainability and taking into account the service and environmental loads, designs were finalized based on 3-D Finite Element Modeling package ETABS. Model houses were constructed at the selected locations to demonstrate them to the local community with an aim that new design or at least some features would be replicated. Performances of these model houses are being monitored. The main aspects of development of disaster resistant housing consists of (i) surrounding environment and sustainability, ii) survey, iii) design, construction and technical improvement, iv) dissemination of learning and v) follow up and monitoring. Finally to develop design guidelines for different stakeholders for using them for pre-disaster design and post disaster response.

Survey format to collect the local information has been attached in Appendix-B.



**Figure 4.** Project sequence followed in the design and construction

##### 4.1 Survey for Collecting Local Information

Survey was jointly conducted by Caritas, BUET and CRAterre-ENSAG to collect local information and intelligent practices and decide about the preliminary design. Following are the key features of the survey conducted:

- Inform the local people about the LCH programme
- Rapport building based on meeting with local authorities, community leaders, etc.
- Development of survey formats for obtaining the social and technical information
- Survey of the types of existing houses, size, material available in consideration to the environment and their costs as well as social map

- Community meeting to understand the overall situation in the village (social and economic conditions including housing)
- Transect walk/observation and selection of houses to be assessed
- Individual house assessment
- Meeting with masons and people involved in the construction to understand types of houses and availability of masons, materials, rates etc.
- Analysis of the survey findings to determine the design strategy for different types of LCH
- Survey report preparation

## **4.2. Design Steps**

As shown in Figure 4, the design evolution followed an iterative approach to incorporate stakeholders' feedback. Main steps followed in the design are as follows:

- Preparation of preliminary design based on primary survey with particular focus on the environment
- Sharing among CB, BUET and CRAterre for feedbacks
- Preparation of the draft design
- Cost estimation
- Sharing the design with the community for their inputs
- Incorporate feedbacks and validation with community
- Selection of treatment method for different elements of the structure
- Preparation of the final design considering sustainability

## **5. Design of LCHs**

LCH design respected local practice, indigenous knowledge availability of building materials and culture of the community. Information is collected to identify the client/beneficiary needs. Availability and skill of the local mason, carpenter have been given consideration. The design considerations in different regions are described briefly below.

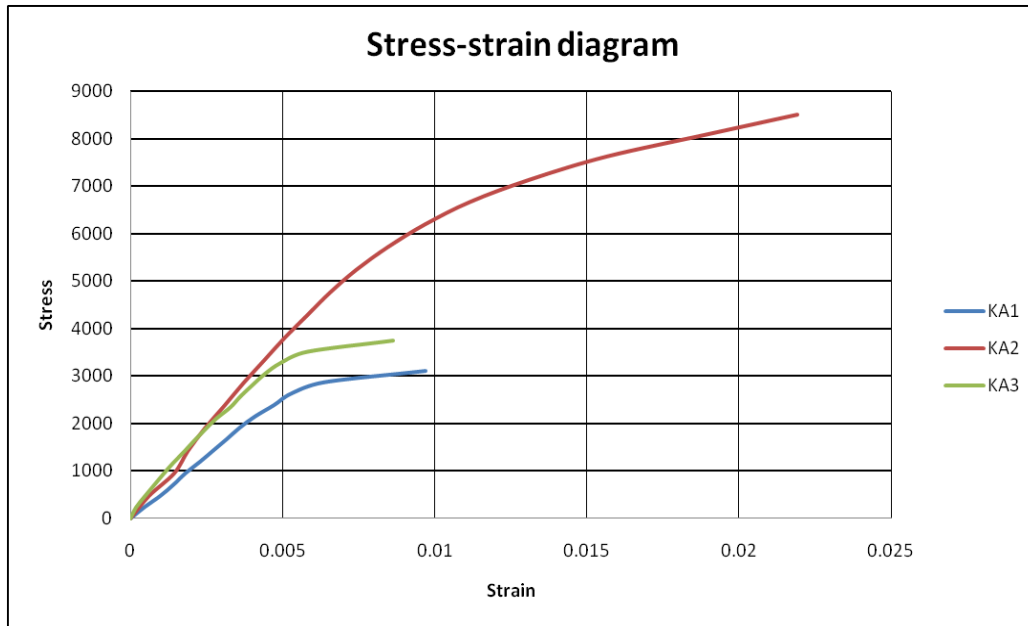
### **5.1 Kuakata: Design in Cyclone-prone Area**

#### **5.1.1 Design Considerations**

A four pitched roof is selected for better wind resistance in the cyclone-prone area. As per BNBC (2006), the house should be designed for 260 kmph fastest mile. However, as these houses are not alternative to cyclone shelter, a realistic compromise on wind speed had been reached. A RC and timber framing system, which is common in the area, is chosen. For the post, 1:2:4 concrete post reinforced with mild steel bars is selected whereas timber from locally available rain tree is used for beams and roof rafters. Timber properties have been ascertained from laboratory testing. A stepped earth plinth is chosen for better protection as the local soil is silty sand. In addition, a clay cover of two inch was provided for better protection and usability. Two parts of bamboo fences were used for better maintenance/repair of the lower part fence and it reduces the repetitive use of the natural resources.

#### **5.1.2 Material Testing**

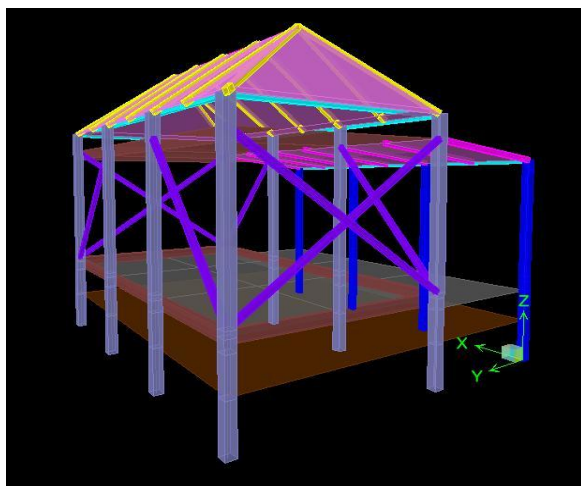
Soils and local building materials (wood, water) were tested at the BUET laboratory. Typical test results on wood sample (rain tree) are presented in Figure 5. Wood samples were tested with different water content. It can be seen that water content has significant effect on the strength of the wood.



**Figure 5.** Stress-strain relationships of wood in different moisture content compression (KA1- Air-dry for 3 weeks, moisture content at test=47%, KA2- Immersed in water for 2 weeks, oven dry and KA3- Immersed in water for 2 weeks, 1 week air-dry, moisture content at test=73%)

### 5.1.3 Finite Element Analysis

Based on the considerations, a 3-D finite element analysis was conducted (Figure 6a). The photograph of the Figure 6b shows the constructed house. FE analyses using ETABS show that diagonal bracing would be better resistant to wind. However, finally the due to construction difficulty, the diagonal bracings were changed to corner bracing as can be seen from Figure 5(b).



(a)



(b)

**Figure 6.** (a) 3-D finite element model of the proposed house in Kuakata; (b) photograph of completed house

## 5.2 Sirajdikhan: Design in Flood Prone Area

A RC and timber framing system, which is common in the area, is chosen. For the post, 1:2:4 concrete post reinforced with mild steel bars is selected whereas timber from locally available rain tree or *mahogany* is used for beams and roof rafters. Timber properties have been ascertained from laboratory testing. A stepped high earth plinth is chosen for better protection as the area is flood prone. Two parts of the bamboo fences are considered for better maintenance/repair of the lower part fence. A loft/mezzanine is provided to save valuables during flood. Based on the considerations, a 3-D finite element analysis was conducted to finalize the design.

## 5.3 Gaibandha: Design in River-bank Erosion Prone Area

The site is flat land and situated on the west bank of Brahmaputra river. Flood, river-bank erosion and strong wind are the main disaster vulnerabilities. It is important to make the house easy to dismantle as river-bank erosion can happen very quickly. In the implemented design, there are joints in the post as well as connection between post and roof system for quick dissemble and reconstruction. To increase the durability of the fence against rain, CGI sheet has been used in the lower part and bamboo fence in the upper part for comfortable dwelling. A number of treatment strategies have also been tried in the location. A photograph of the completed house is shown in Figure 7.



Figure 7. Photograph of completed house in Gaibandha

## 5.4 Dhubaura, Mymensingh: Design in Flash Flood Prone Area

Main design consideration in this region is flash flooding of Nitai river. Stepped plinth has been incorporated and roofing has been extended to increase the life of the fence. Two-part fence- thin CGI sheet in the lower part and bamboo thatch in the upper part- has been introduced. Platform in the center of the house was provided for storing goods.

## 5.5 Kanaighat, Sylhet: Design in Flash Flood Prone Area

Main design consideration in this region is sudden flooding of Surma river. Improved plinth has been designed using locally available stones. These stones are not suitable for using as coarse aggregate in civil construction



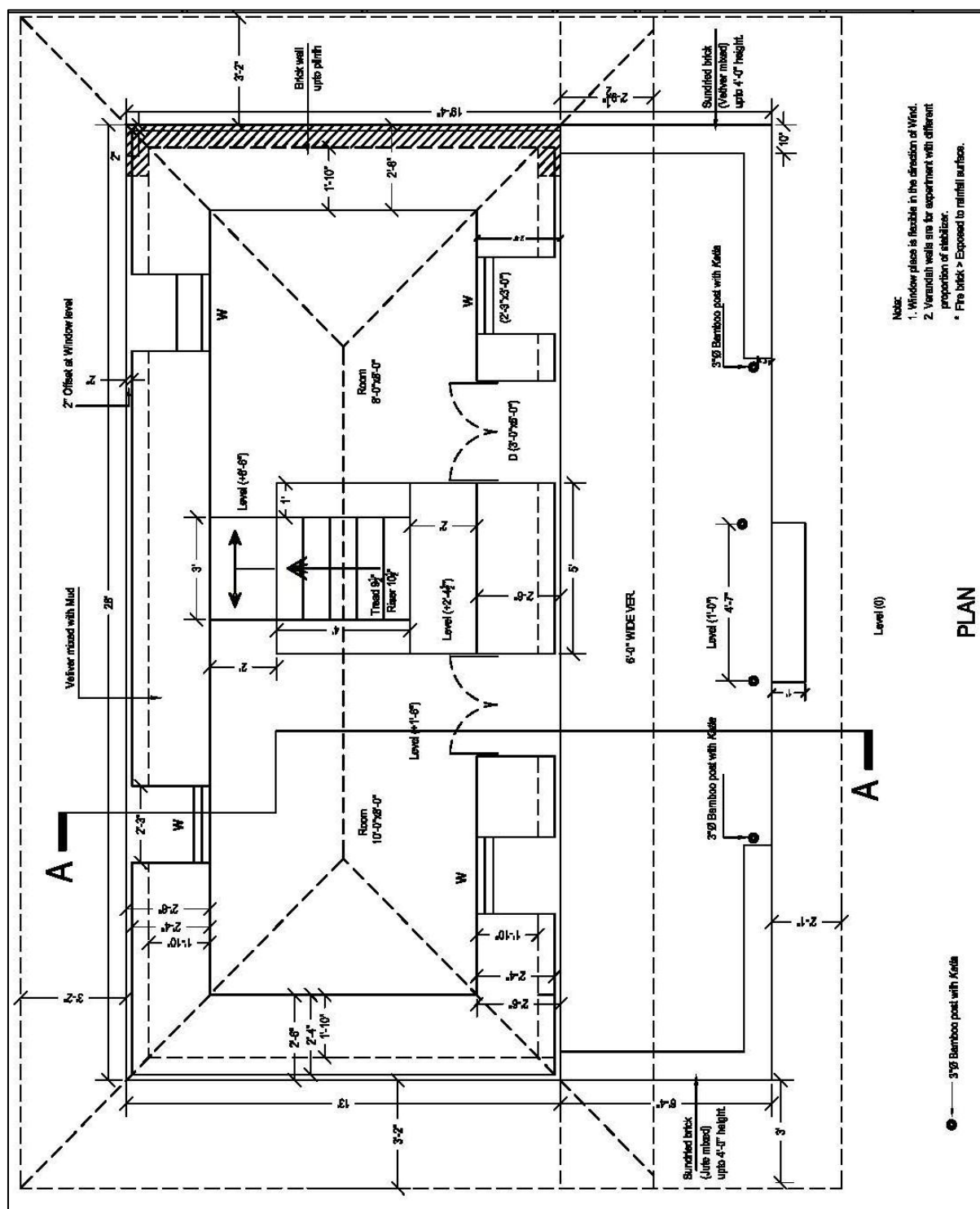
works as the quality is not satisfactory. Half wall made with mud and local stone has also been tried and demonstrated to the local people and masons. It has been observed that dampness in plinth is a problem of local houses and the situation is improved in the new design. Bracings are incorporated to increase lateral wind resistance. A photograph of the completed house is shown in Figure 8.



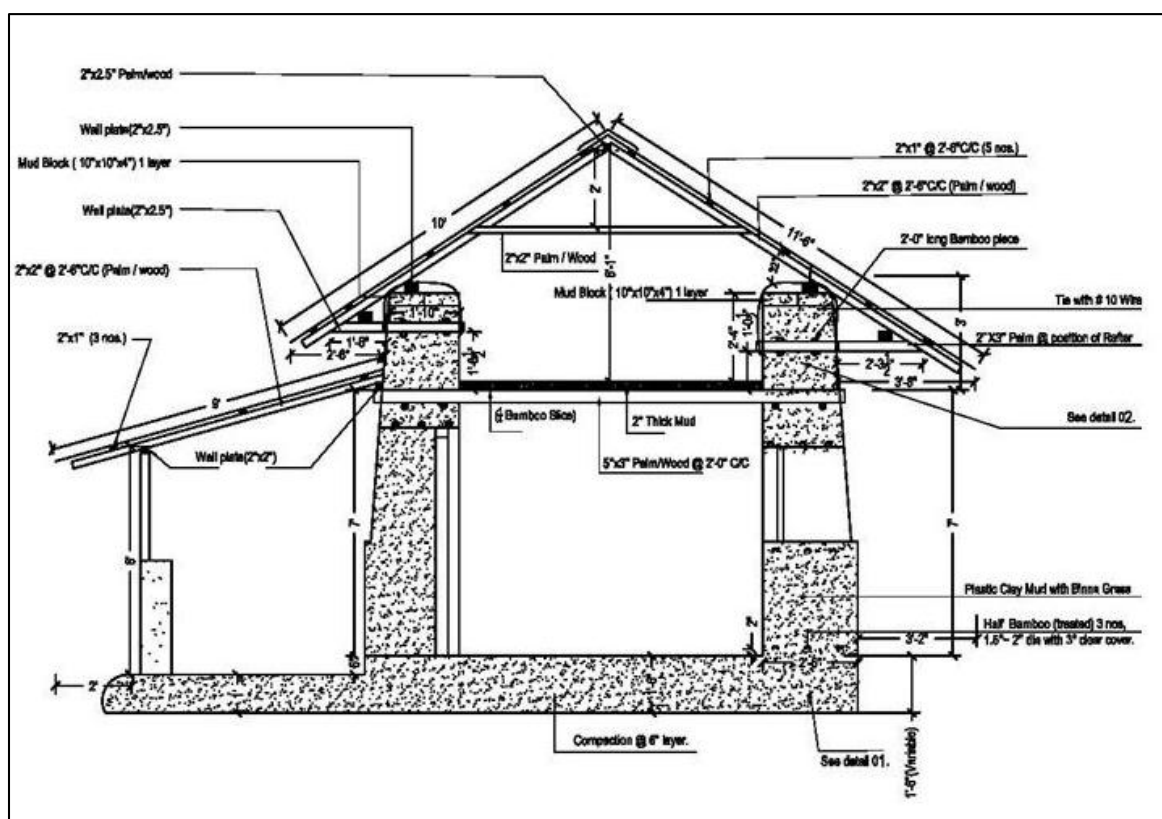
**Figure 8.** Photograph of completed half walled house with stone plinth in Kanaighat, Sylhet

## 5.6 Porsha, Naogaon: Drought Prone Area

Mud wall stabilization has been used in the design employing local natural fibers i.e. jute and vetiver to reduce thickness of wall to decrease earthquake vulnerability. This has been demonstrated to the local community and masons so that stabilized blocks can be prepared even in the dry season when water is scarce. To improve the durability of mud walls against rain-cut erosion, stabilized blocks and fire bricks have been used. Bamboo strips have been incorporated in layers to enhance ductility of the building system. Alternate design has also been developed for disaster response using bamboo brunches *tati* wall and bamboo post with the provisions of future addition of mud wall for comfortable living which is a common feature of local houses. Plan and section of the completed house is shown in Figure 9 and Figure 10, respectively. Another type, *tati* wall with RC and bamboo posts has been designed for low income people. In this type, *tati* wall is made with locally available plant covered by mud plaster on both sides.







**Figure 10.** Section of the constructed improved mud house in Porsha, Naogaon

## 5.7 Assasuni, Satkhira: Cyclone and Flood in Coastal Saline Region

Raised plinth of 3 to 4 feet height is common in the area. Mud wall stabilization has been used in the design employing local natural fibers i.e. jute and rice-husk. Mixing of such natural fibers is effective in improving strength and ductility (Islam and Iwashita, 2010). Bamboo strips have been incorporated in layers to enhance ductility of the building system. Alternate design has also been developed for disaster response using RC and bamboo post with the provisions of future addition of mud wall for comfortable living which is a common feature of local houses. Frame of bamboo and RC post are added outside to the mud wall system so that even if the mud wall is washed away during flood, the building will remain intact on the frame. A photograph of the completed house is shown in Figure 11. Environment-friendly clay tiles have been used as roof materials.



**Figure 11.** Photograph of completed house in Assasuni, Satkhira

## 5.8 Bandarban: Hilly Region

In the hilly regions of Bandarban, it is a common practice of the indigenous people to live in an elevated house, commonly known as *machan* house. Timber is available in the region, however, large procurement from the forest is putting extra pressure on the already continuing deforestation process. Less timber has been used in the design with suitable treatment scheme to increase the durability. A joint, locally known as *katla*, has been incorporated in the timber post to improve durability. Bracings are also included to enhance lateral load carrying capacity. However, another type, house-on-ground has also been designed. Photographs of *machan* house and house on ground are shown in Figure 12a and 12b, respectively.



**Figure 12.** (a) Photograph of machan house and (b) house on ground in Bandarban

## 6. Construction of Houses

Six houses were constructed in each regions. Construction of the houses were done in the following steps under supervision of Caritas, BUET and CRATERre-ENSAG:

- Formation of Project Committee
- Community-led beneficiaries selection
- Training of masons
- Selection of masons for house construction
- Procurement of materials
- Treatment of materials
- Organization of the house, position and space arrangement
- Construction of one house for each model
- Validation of houses by the community, Caritas and BUET for improvements
- Providing feedbacks on the constructed houses for design improvements
- Construction of the rest houses
- Technical Improvement/ repair of existing houses

## 7. Monitoring/Follow up Phase

After the construction and handing over to the owner, the houses are continuously being monitored by CB and BUET. A format of monitoring sheet is attached with this report in Appendix- C. Feedback and learning from the monitoring are recorded systematically which would be used in future design and construction of LCHs. It is interesting to note that some of the design features have already been adopted by the local people.

## 8. Cost

Cost per house and cost per sqft according to budget are presented in Figure 13 and Figure 14, respectively. The cost of actual construction was within the budge ranges from 1,30,000 to 75,000 BDT.

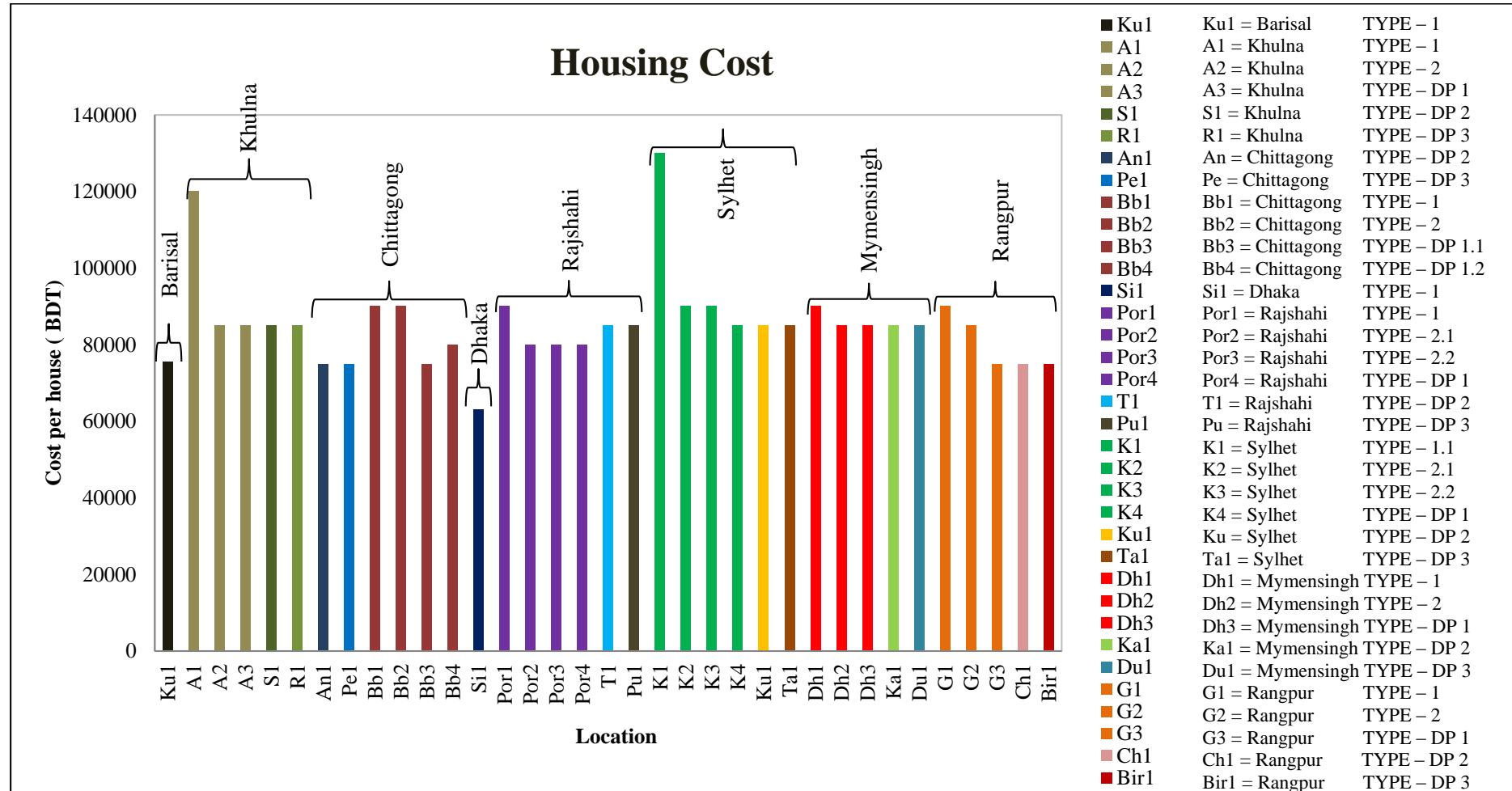


Figure 13. Cost per house

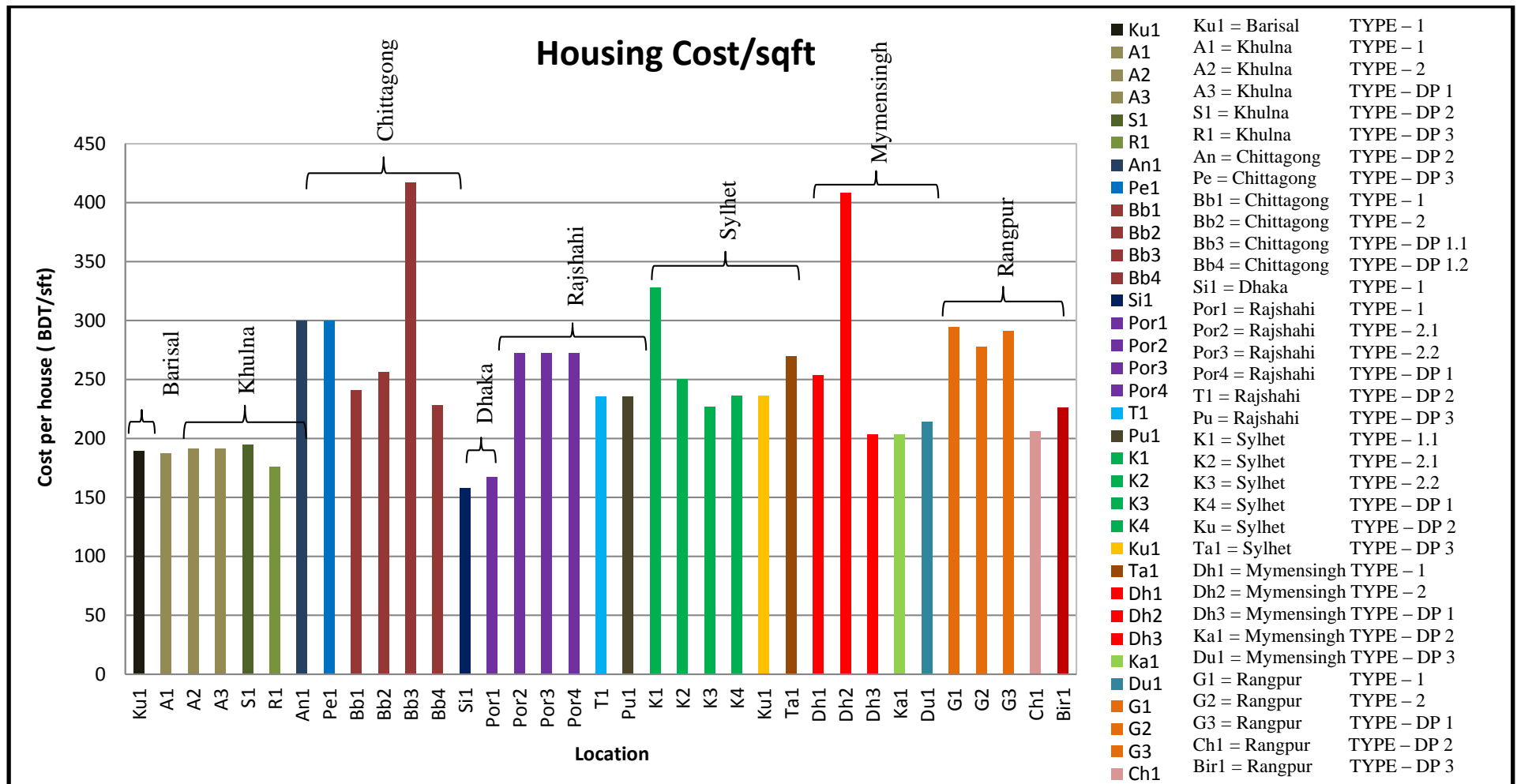


Figure 14. Housing Cost/sqft

## **9. Summary and Recommendations**

It is of utmost importance to develop design of disaster resilient LCH to minimize frequent damage and achieve a sustainable development of the country with minimum deterioration of the surrounding environment. At the same time it is imperative to develop design of houses that can be built quickly after a disaster as a rapid response to post-disaster situation. It is the social responsibility of architects, engineers, educational institutions and civil society members to take positive initiatives in this regard.

The main aspects and achievements of the research project are as follows:

- 1) In designing houses the type and level of hazard were first ascertained. It was decided to use locally available materials and technology and show respect for local culture and practice. The skill of local mason and carpenters were also kept in mind. Importance was also given to affordability, safety and replicability of the community.
- 2) Thirty five designs have been developed in this research for eight different geographic regions of Bangladesh which will be useful for any individual, the Government and NGOs for constructing disaster resilient rural houses.
- 3) 110 pilot houses were constructed in all eight geographic regions of the country based on community participation. Necessary adjustments were incorporated based on people's and masons' feedback.
- 4) The completed houses are continuously being monitored and have been found to perform well so far.
- 5) The designs have been found to be accepted by the local community and some features are already replicated.
- 6) 35 disaster prototype designs have also developed for some regions so that houses can be constructed rapidly by NGOs and Government agencies after a disaster.
- 7) Caritas staff members have incorporated their acquired knowledge and skills in disaster preparedness and emergency response activities. CB also aims to disseminate the acquired learning to national and international NGOs, government sectors and Caritas International partners.
- 8) Educational institute like BUET is incorporating the learning from the project into their class lectures. Expansion of research regarding LCH and related topics will have to be included in the curriculum of the technical institutes and universities without delay.
- 9) In designing and construction of houses, in every region, special attention is given to surrounding environment and sustainable issues by using less material, enhancing durability using effective treatment schemes.

Based on the experience, learning and designs developed, third phase of the project is being executed to prepare manuals for LCH design and construction. Different manuals/brochures for different stake-holders- policy makers, NGOs, educators, local masons- will be developed.

## **Acknowledgements**

This work was financially supported by Secours Catholique/Caritas France and Caritas Luxemburg, the authors express their sincere gratitude. Cooperation and participation of local people and community leaders in all regions are highly appreciated.

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BUET

# Development of Disaster Resilient Affordable House Design for Different Regions of Bangladesh



**Dinajpur Zone:** This zone is located in Northern part of Bangladesh. Flood, river-bank erosion and strong wind are the main disaster. It is important to make the house easy to dismantle as river-bank erosion can happen very quickly. In the implemented design, there are joints in the post as well as connection between post and roof system for quick dissemble and reconstruction. To increase the durability of the fence against rain, CGI sheet has been used in the lower part and bamboo fence in the upper part for comfortable dwelling. Housing cost was 75,000-90,000 BDT. Main house is 24 ft×10.5 ft.



**Rajshahi Zone:** This is a drought prone zone located at North-West side of Bangladesh. Temperature rises upto 45 degree Celcius. Local houses are generally mud house with thick wall (about 3). So mud wall stabilization has been used in the design by using local natural fibers i.e., jute and vetiver to reduce wall thickness. To improve durability stabilized blocks and fire bricks have been used. Alternate design has also been developed for disaster response using local plant ikor and bamboo post. Housing cost was Tk. 80,000-90,000 BDT. Main house is about 23 ft×18 ft and varanda is 23 ft ×6 ft (if provided).



**Mymensingh Zone:** This zone is located on greater Mymensingh. Socio-economic condition in this area is poor. This area is a flood prone flat land. So main design consideration in this region is flash flooding of Nitai river. Stepped plinth has been incorporated and roofing has been extended to increase the life of the fence. Two-part fence- thin CGI sheet in the lower part and bamboo thatch in the upper part- has been introduced. Platform in the center of the house was provided for storing goods. Housing cost was 85,000-90,000 BDT. Main house is 18 ft×10 ft and varanda is 12.5 ft×5 ft.



**Sylhet Zone:** This is a flash flood prone zone located at North-East side of Bangladesh. Main design consideration in this region is sudden flooding of Surma river. Improved plinth has been designed using locally available stones which is new for the region. Half wall made with mud and local stone has also been tried and demonstrated to the local people and masons. Dampness in plinth is a problem of local houses and these are improved in the new design. Bracings are provided to increase lateral wind resistance. Housing cost was 85,000-130,000 BDT. Main house is 21 ft×11 ft and varanda is 21 ft×4 ft.



**Floodplain Zone (Sirajdikhan):** This area is a floodprone flat land. RC and timber framing system, which is common in the area, is chosen. For the post, 1:2:4 R.C.C. post is selected whereas timber from locally available tree is used for beams and roof rafters. A stepped high earth plinth is chosen for better protection as the area is flood prone. Two parts of the bamboo fences are considered for better maintenance/repair of the lower part fence. A loft/mezzanine is provided to save valuables during flood. Housing cost was 63,000 BDT. Main house is 19 ft×10 ft and varandah is 19 ft×6 ft.



**Satkhira Zone:** This area is a plain land near river (Kholpatua) bank under coastal zone. Soil is mainly silt and water is slightly saline. Raised plinth of 4 to 5 ft height is common in the area. Mud wall stabilization has been used in the design employing local natural fibers i.e., jute and rice-husk. Bamboo strips have been used in layers to enhance ductility of the building system. Alternate design has also been developed for disaster response using RC and bamboo post with the provisions of future addition of mud wall for comfortable living which is a common feature of local houses. Housing cost was 85,000-120,000 BDT. Main house is 21.5 ft×19 ft.



**Cyclone-Prone Zone (Kuakata):** This zone is located on Coastal regions of Bangladesh. A four pitched roof is selected for better wind resistance. A RC and timber framing system, which is common in the area, is chosen. R.C.C. post and timber from locally available tree is used for beams and roof rafters. A stepped earth plinth is chosen as the local soil is silty sand with a two inch clay cover was provided for better protection. Two parts of bamboo fences were used for better maintenance/repair of the lower fence. Housing cost was 75,500 BDT. Main house is 18 ft×10 ft and varandah is 18 ft×6 ft 7 inch.



**Bandarban Zone:** Bandarban is located in South-Eastern Bangladesh i.e. in Chittagong Hill Tracts. The main disasters are flash floods, landslides due to heavy rain, earthquake, fire and strong wind. Here Indigenous people live in an elevated house, known as machan house. Timber is available but already started deforestation process. Less timber has been used in the design with suitable treatment scheme to increase the durability. A joint, locally known as katla, has been used in the timber post to improve durability. Bracings are also included to enhance lateral load carrying capacity. Housing cost was Tk. 75,000-90,000 BDT. Main house is 18 ft×15 ft and varandah is 18 ft × 8 ft.



Assasuni



Bandarban



Kanaighat



Porsha

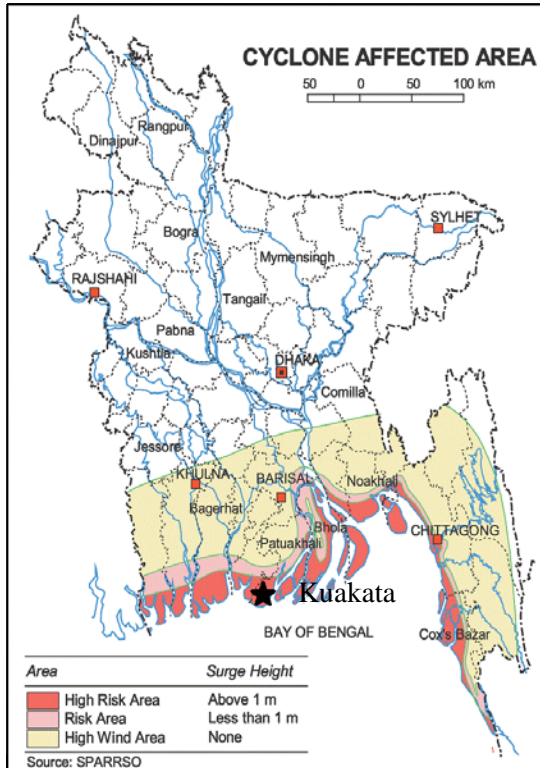


Gaibandha



## DIVISION: BARISHAL

### 1. DESIGN OF LCH IN KUAKATA: TYPE – 1



#### SITE TOPOGRAPHY



#### General Information:

##### Location:

District: Patuakhali  
Upazila: Kuakata  
Union: Dhulaswar  
Mouza/ Village: Chargangamoti

##### Climatic Feature: Saline area

Avg. Maximum Temperature: 34 °C  
Avg. Minimum temperature: 12.1°C  
Annual Rainfall: 2506 mm  
Average Relative Humidity: 81%

##### Geotechnical Feature:

Topography: Flat cyclonic area under coastal zone  
MSL: 2.5 m  
Soil Characteristics: Silty sand

##### Disaster:

Cyclone and tidal surge



**Completed House**

#### Design Considerations:

Available Building Materials: Mud, Bamboo, timber, sand, brick, MS rod, CGI sheet etc

Foundation: Wooden/ Bamboo posts embedded in soil (1-2 ft)

Plinth: Mud

Post: RC pillar and bamboo post

Fence/Wall: Bamboo mat (2 parts)

Openings: 1 main door + 1 inside door to connect rooms

Ceiling: Ceiling is considered to protect heat and cold

Treatment (bamboo & wood): Water treatment and partial chemical treatment

Roof Type: Four pitched and Veranda  
roof disconnected from main roof

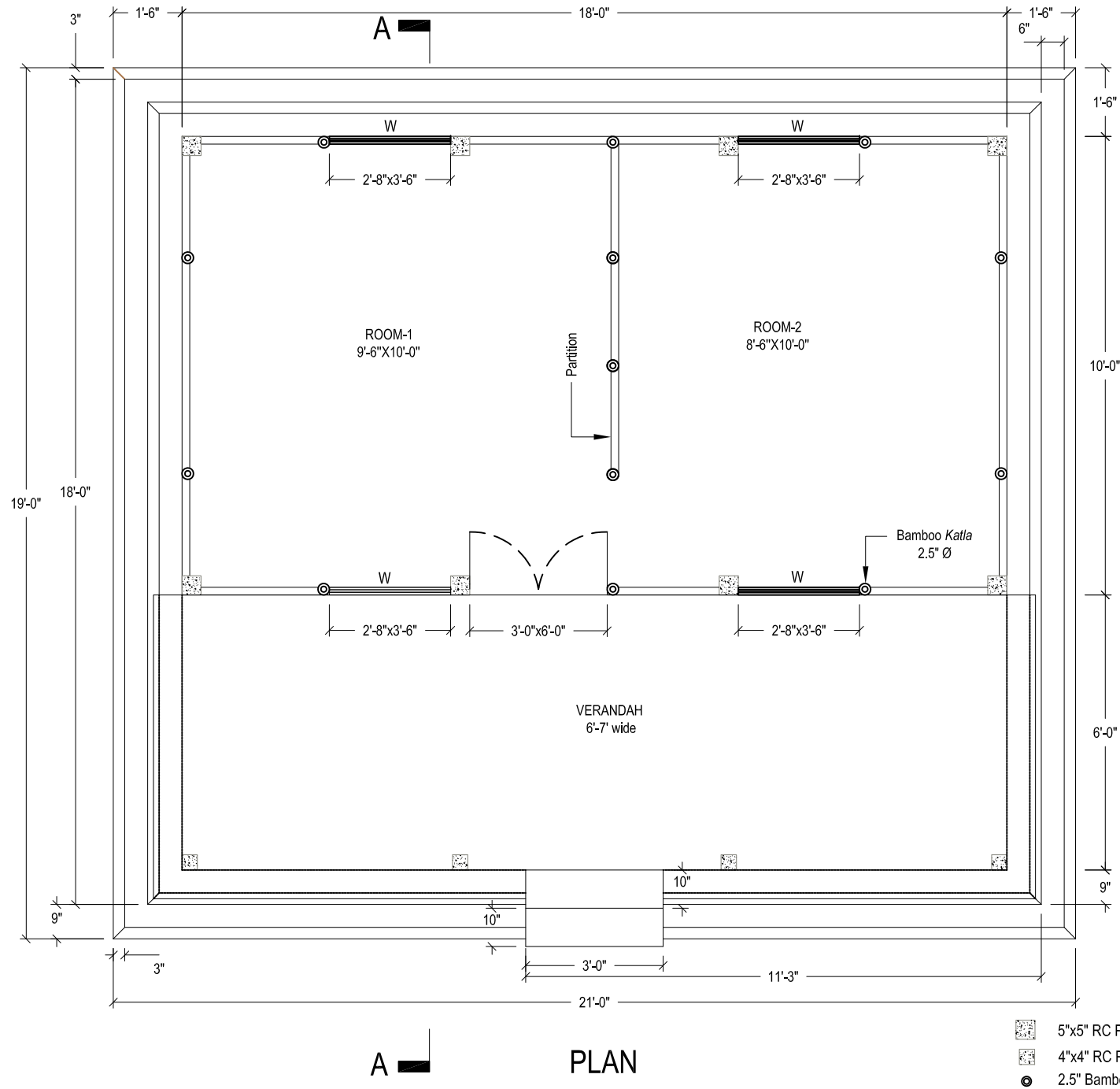
Roof cover: CGI sheet

Roof structure: Wooden truss,

Bracing: Corner bracing

Cost: Tk. 75,500





PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: KUAKATA, PATUAKHALI

TYPE 1 : CGI Sheet with Bamboo Fence

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

Md. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

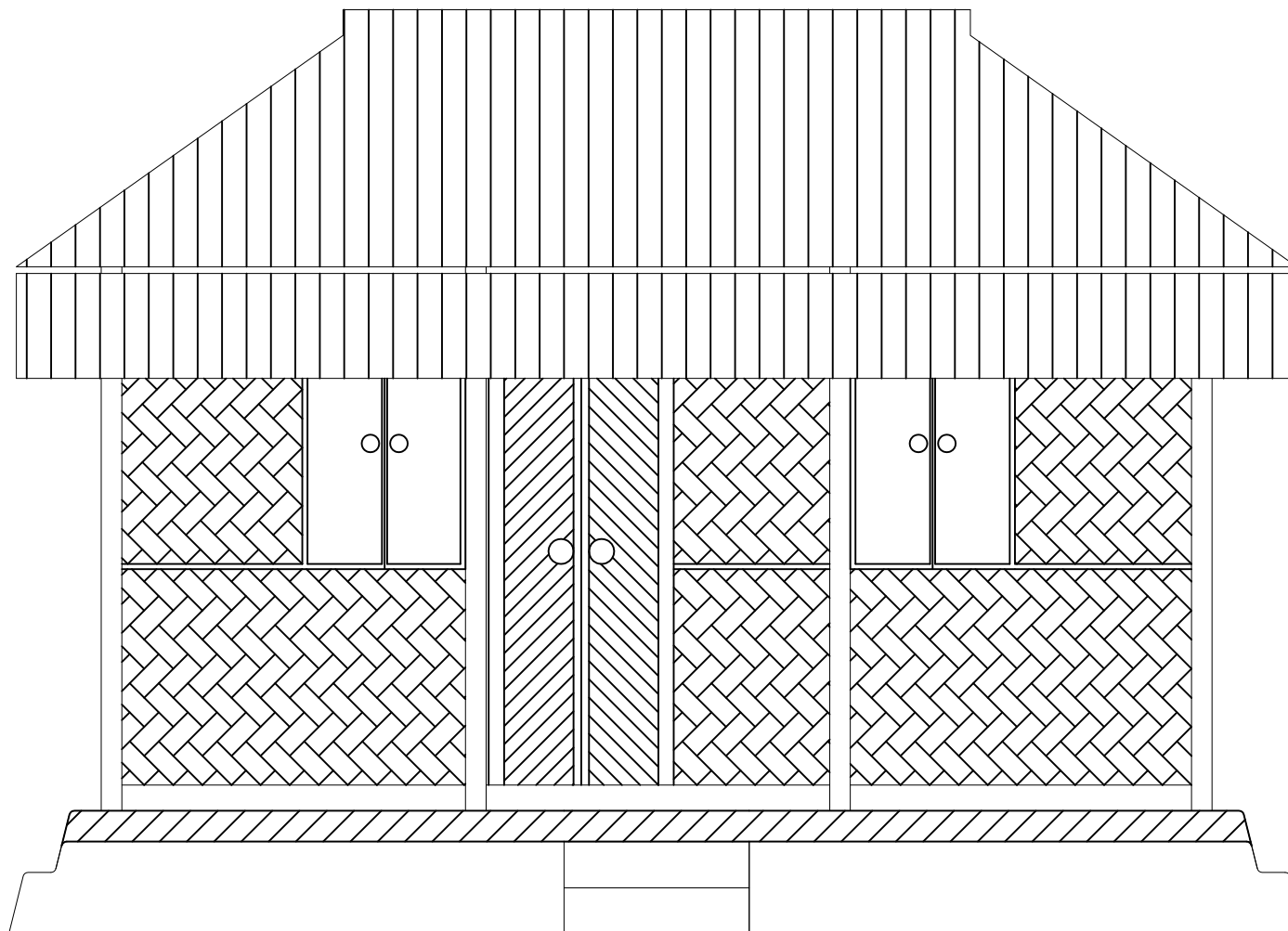
DRAWING TITLE:

PLAN

JULY 2015

SHEET NO:

S - 01



FRONT ELEVATION

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: KUAKATA, PATUAKHALI

TYPE 1 : CGI Sheet with Bamboo Fence

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

Md. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

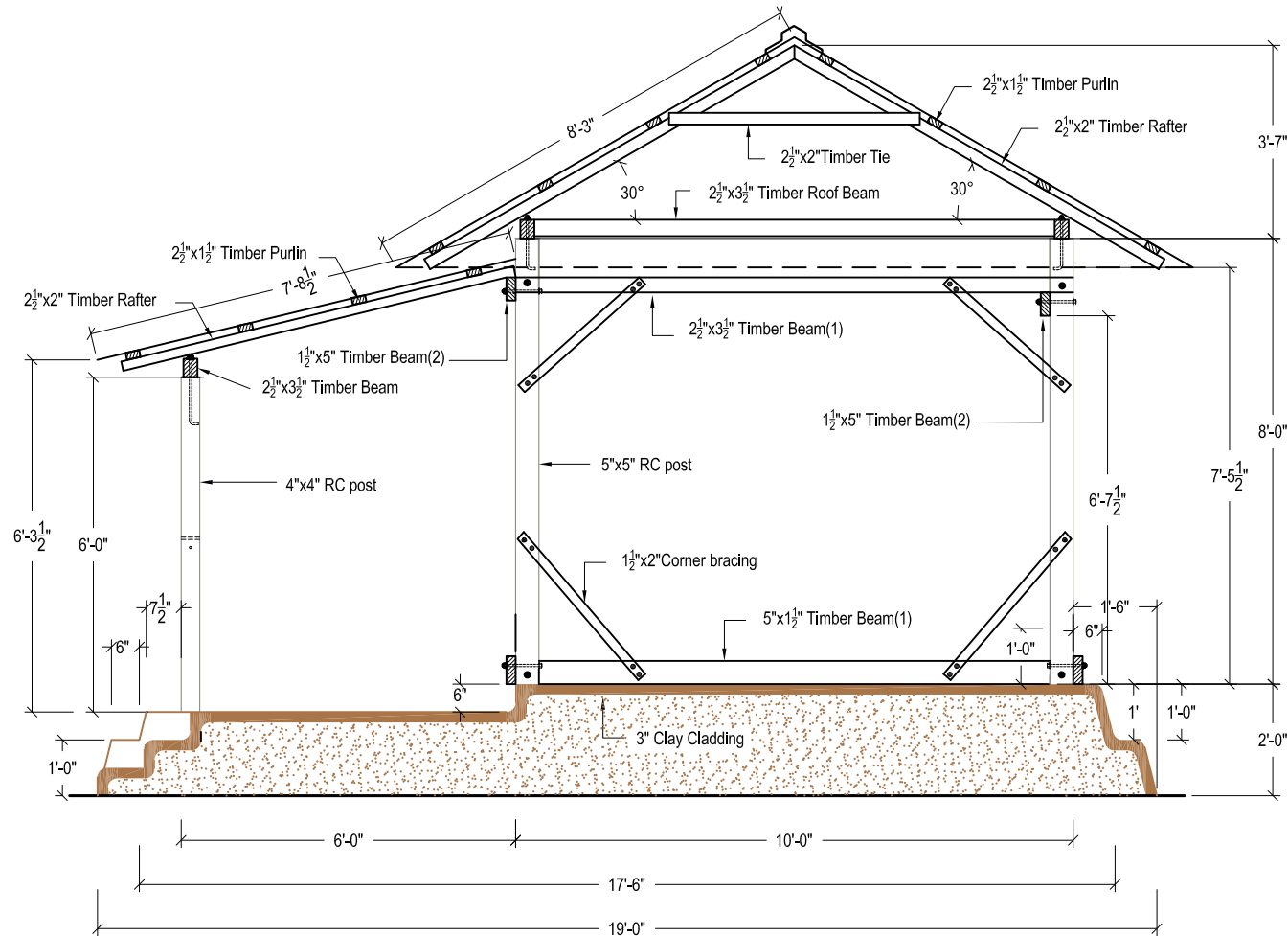
DRAWING TITLE:

FRONT ELEVATION






JULY 2015

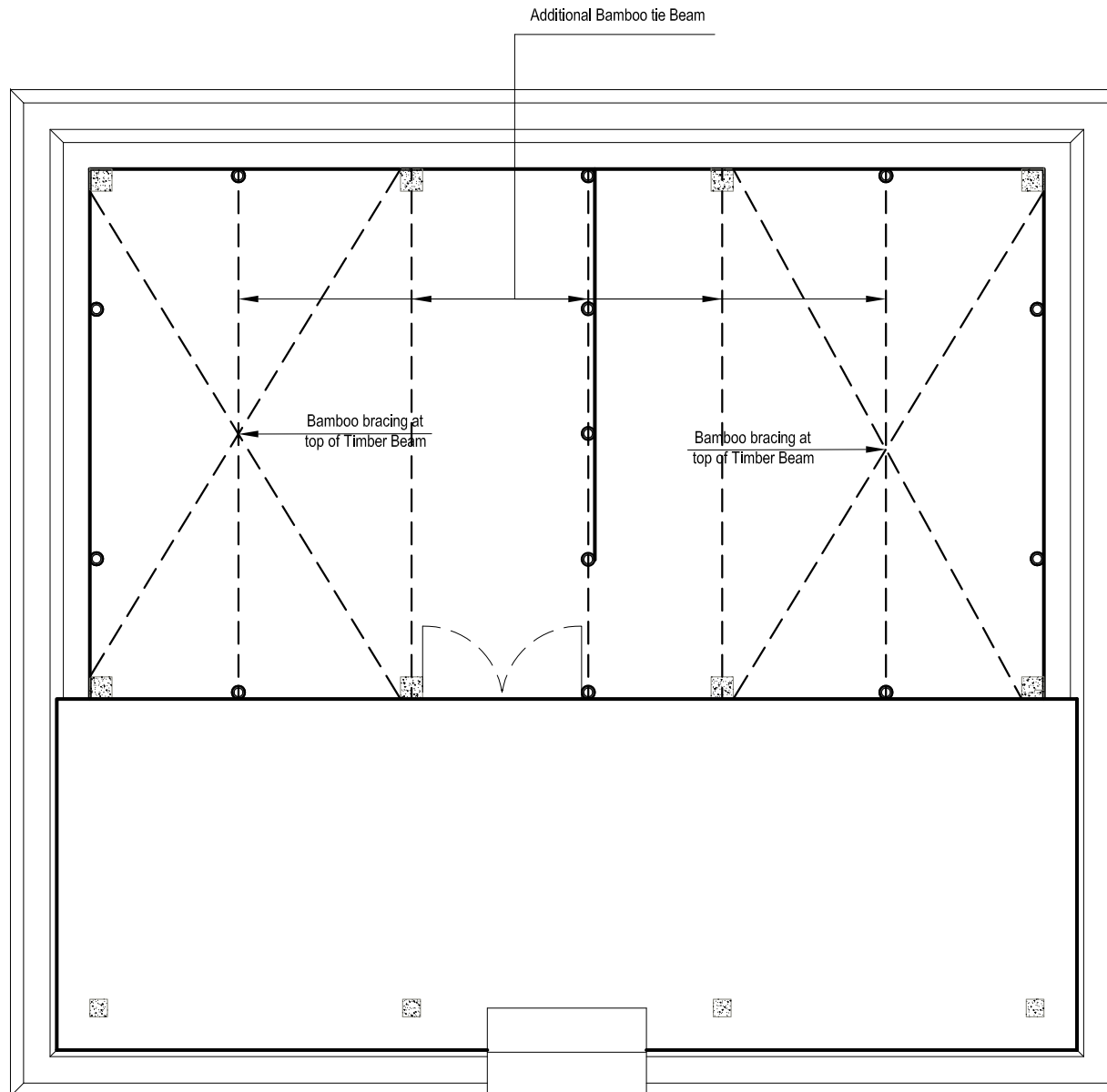
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S - 03








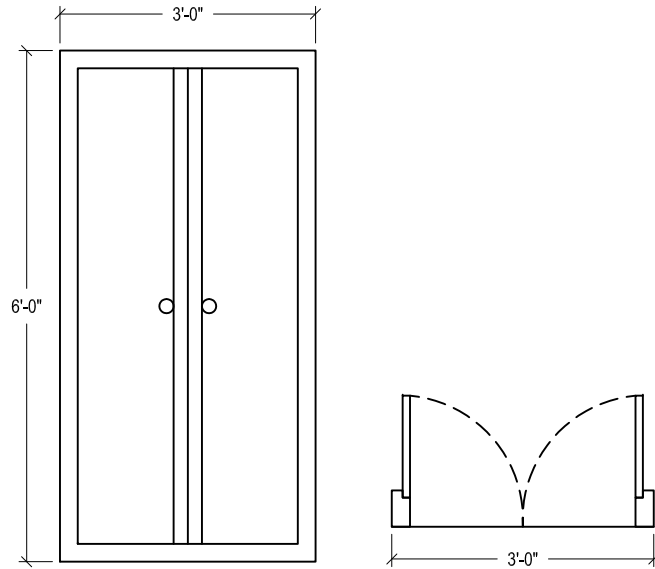
SECTION A - A

PROJECT NAME :	
CONSTRUCTION OF PILOT LOW COST HOUSES (LCH)	
LOCATION: KUAKATA, PATUAKHALI	
TYPE 1 : CGI Sheet with Bamboo Fence	
CONSULTANTS	
 <p>DEPARTMENT OF CIVIL ENGINEERING, BRTC, BUET, DHAKA BANGLADESH</p>	 <p>ENSAG-CRAterre Grenoble , France</p>
DESIGN BY:	
<p><u>BUET</u> 1. Prof. Dr. Tahsin Reza Hossain 2. Prof. Dr. Mohammad Sharif Islam</p> <p><u>CRAterre</u> 3. Engr. Olivier Moles</p> <p><u>Caritas, Bangladesh</u> 1. Mr. Ratan Kumar Podder</p>	
DRAWN BY :	
Md. ABU SAYED RASHED	
CLIENT	FUNDING AGENCIES
 <p>CARITAS BANGLADESH</p>	 <p>CARITAS FRANCE</p>  <p>CARITAS LUXEMBOURG</p>
DRAWING TITLE:	
SECTION A - A	
JULY 2015	SHEET NO: S - 02

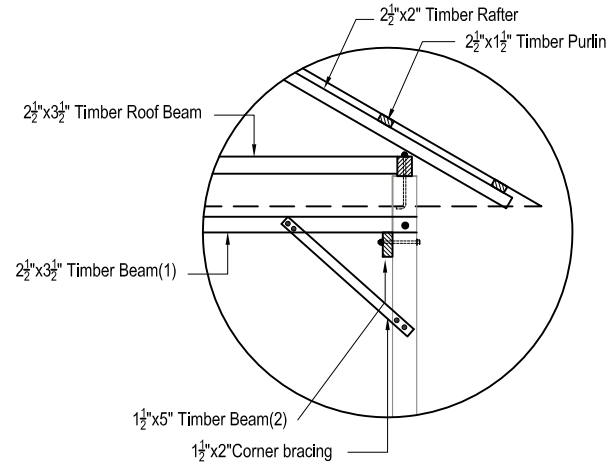


BRACING PLAN

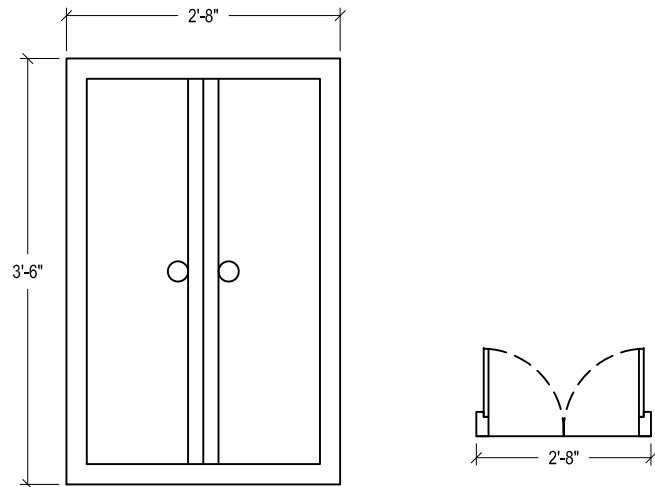
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CONSTRUCTION OF PILOT LOW COST HOUSES (LCH)	
LOCATION: KUAKATA, PATUAKHALI	
TYPE 1 : CGI Sheet with Bamboo Fence	
CONSULTANTS	
 <p>DEPARTMENT OF CIVIL ENGINEERING, BRTC, BUET, DHAKA BANGLADESH</p>	 <p>ENSAG-CRAterre Grenoble , France</p>
DESIGN BY:	
<u>BUET</u> 1. Prof. Dr. Tahsin Reza Hossain 2. Prof. Dr. Mohammad Shariful Islam  <u>CRAterre</u> 3. Engr. Olivier Moles  <u>Caritas, Bangladesh</u> 1. Mr. Ratan Kumar Podder	
DRAWN BY :	
Md. ABU SAYED RASHED	
CLIENT	FUNDING AGENCIES
 <p>CARITAS BANGLADESH</p>	 <p>CARITAS FRANCE</p>  <p>CARITAS LUXEMBOURG</p>
DRAWING TITLE:	
BRACING PLAN	
JULY 2015	SHEET NO: S - 04



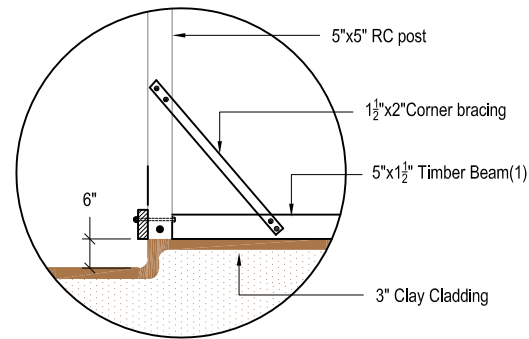
Detail 01: Door



Detail 03: Corner Bracing and Roof Arrangement



Detail 02: Window



Detail 04: Katla Joint

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: KUAKATA, PATUAKHALI

TYPE 1 : CGI Sheet with Bamboo Fence

CONSULTANTS



DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESH



ENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

Md. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES



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BANGLADESH



CARITAS FRANCE



CARITAS  
LUXEMBOURG

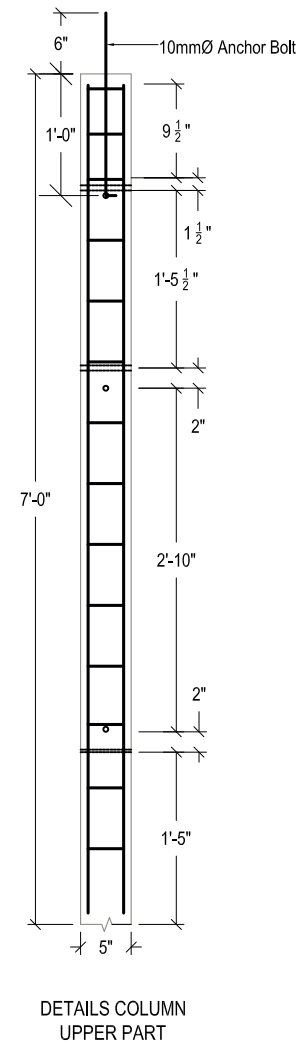
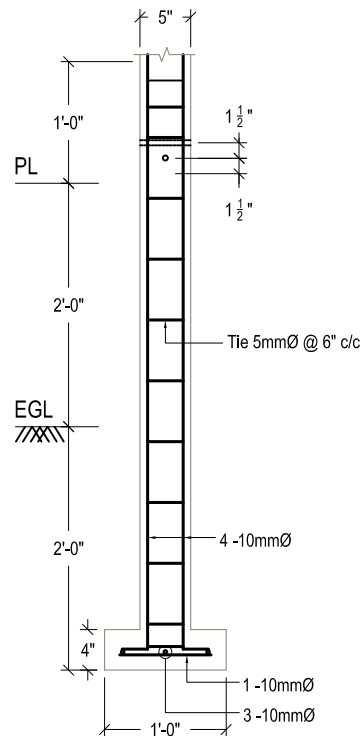
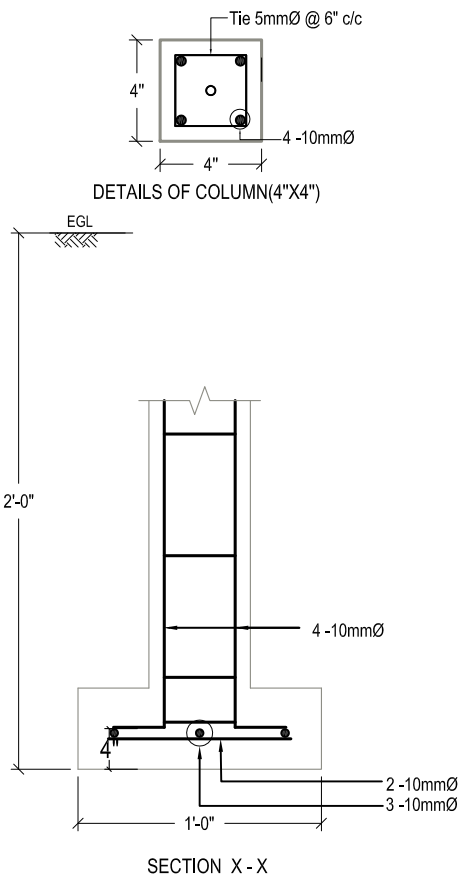
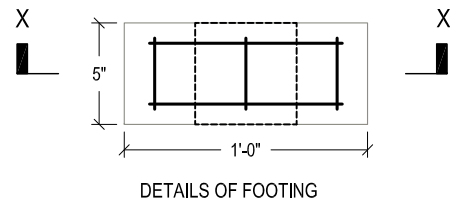
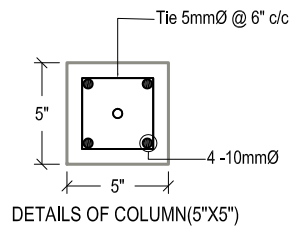
DRAWING TITLE:

DETAIL

JULY 2015






SHEET NO:

S - 05



NOTE :

Concrete - 1 : 2 : 4  
Aggregate - Brick Chips  
- Sylhet Sand  
Reinforcement - 60 Grade  
Clear Cover -  $\frac{3}{4}$  "

PROJECT NAME :	
CONSTRUCTION OF PILOT LOW COST HOUSES (LCH)	
LOCATION: KUAKATA, PATUAKHALI	
TYPE 1 : CGI Sheet with Bamboo Fence	
CONSULTANTS	
 <p>DEPARTMENT OF CIVIL ENGINEERING, BRTC, BUET, DHAKA BANGLADESH</p>	 <p>ENSAG-CRaterre Grenoble , France</p>
DESIGN BY:	
<p>BUET</p> <p>1. Prof. Dr. Tahsin Reza Hossain 2. Prof. Dr. Mohammad Shariful Islam</p> <p>CRAterre</p> <p>3. Engr. Olivier Moles</p> <p>Caritas, Bangladesh</p> <p>1. Mr. Ratan Kumar Podder</p>	
DRAWN BY :	
Md. ABU SAYED RASHED	
CLIENT	FUNDING AGENCIES
 <p>CARITAS BANGLADESH</p>	 <p>CARITAS FRANCE</p>  <p>CARITAS LUXEMBOURG</p>
DRAWING TITLE:	
DETAIL	
JULY 2015	SHEET NO: S - 06

MEMBER SCHEDULE				
SL.	ITEMS NAME	DIMENSIONS	MATERIALS NAME	REMARKS
1.	Roof Cover	0.32 mm	CGI Sheet	
2.	Purlin	2"X1.5"	Timber	@ 2'-6" C/C
3.	Rafter	2" to 2.5" dia	Bamboo	@ 2'-6" TO 3'-6" C/C
4.	Center Rafter	2"x2.5"	Timber	
5.	Tie	2"x1.5" Timber & 2" dia bamboo	Timber & Bamboo	@ 3'-0" to 4'-0" C/C (Alternate)
6.	Roof Beam	2.5"x3.5" Timber & 3" dia bamboo	Timber & Bamboo	@ 4'-0" C/C (Alternate)
7.	Wall Plate	2"x3"	Timber	
8.	Corner Bracing	2"x2.5"	Timber	Both top and bottom
9.	Fance (Top)		Bamboo Mat	
10.	Fance (Bottom)	0.25 mm	CGI Sheet	3' height
11.	Interior Post	5"x5"x11'-0"	R C	4-8 mm Ø 1:2:4 Concrete
12.	Corner Post	4"x4"x11'-0"	R C	4-8 mm Ø 1:2:4 Concrete
13.	Fance Supporting Post	2.5" dia	Bamboo	
14.	Door	3'-0"x6'-0"	Timber	Position may be changed
15.	Window	2'-8"x3"-6"	Timber	Position may be changed
16.	Angle Bar	1.5"x0.25"x1'-6"	Steel	10" in concrete, 8" open to joint bolt

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: KUAKATA, PATUAKHALI

TYPE 1 : CGI Sheet with Bamboo Fence

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain  
2. Prof. Dr. Mohammad Shariful Islam

CRAAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

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BANGLADESH

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CARITAS  
LUXENBOURG

DRAWING TITLE:

MEMBER SCHEDULE

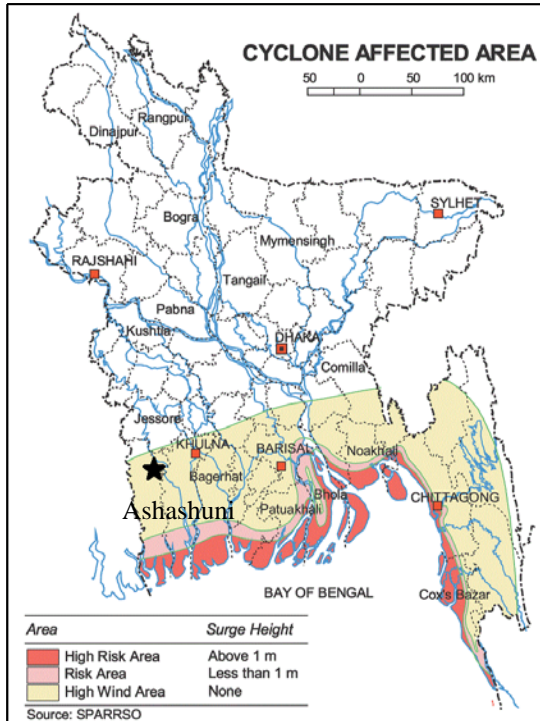
JULY 2015

SHEET NO:

S - 07

## DIVISION: KHULNA

### 2. DESIGN OF LCH IN ASHASHUNI: TYPE – 1



#### SITE TOPOGRAPHY



#### General Information:

##### Location:

District: Satkhira

Upazila: Ashashuni

Union: Ashashuni

Mouza/ Village: Hashkhali

##### Climatic Feature: Saline area

Avg. Maximum Temperature: 35.5 °C

Avg. Minimum temperature: 12.5°C

Annual Rainfall: 1710 mm

Average Relative Humidity: 76%

##### Geotechnical Feature:

Topography: Plain land near river bank

MSL: 3 m

Soil Characteristics: Silt

##### Disaster:

Tidal surge, Cyclone and tidal surge, River Flood, Strong Wind



Completed House

#### Design Considerations:

Available Building Materials: Mud, Bamboo, RC post, CGI sheets, Tiles, *Golpata*, Wood etc

Foundation: Bamboo posts/ *katla* embedded in soil (1-2 ft)

Plinth: Mud (two/three steps)

Post: RC posts at the corners of outer periphery + Treated bamboo on *katla*

Openings: 1 main door & open veranda at four sides

Ceiling: Ceiling is considered to protect heat and cold

Joints: Nails, notches, GI wire

Roof Type: Four pitched and Veranda

roof disconnected from main roof

Roof cover: Burnt mud tiles

Roof structure: Wooden/bamboo truss

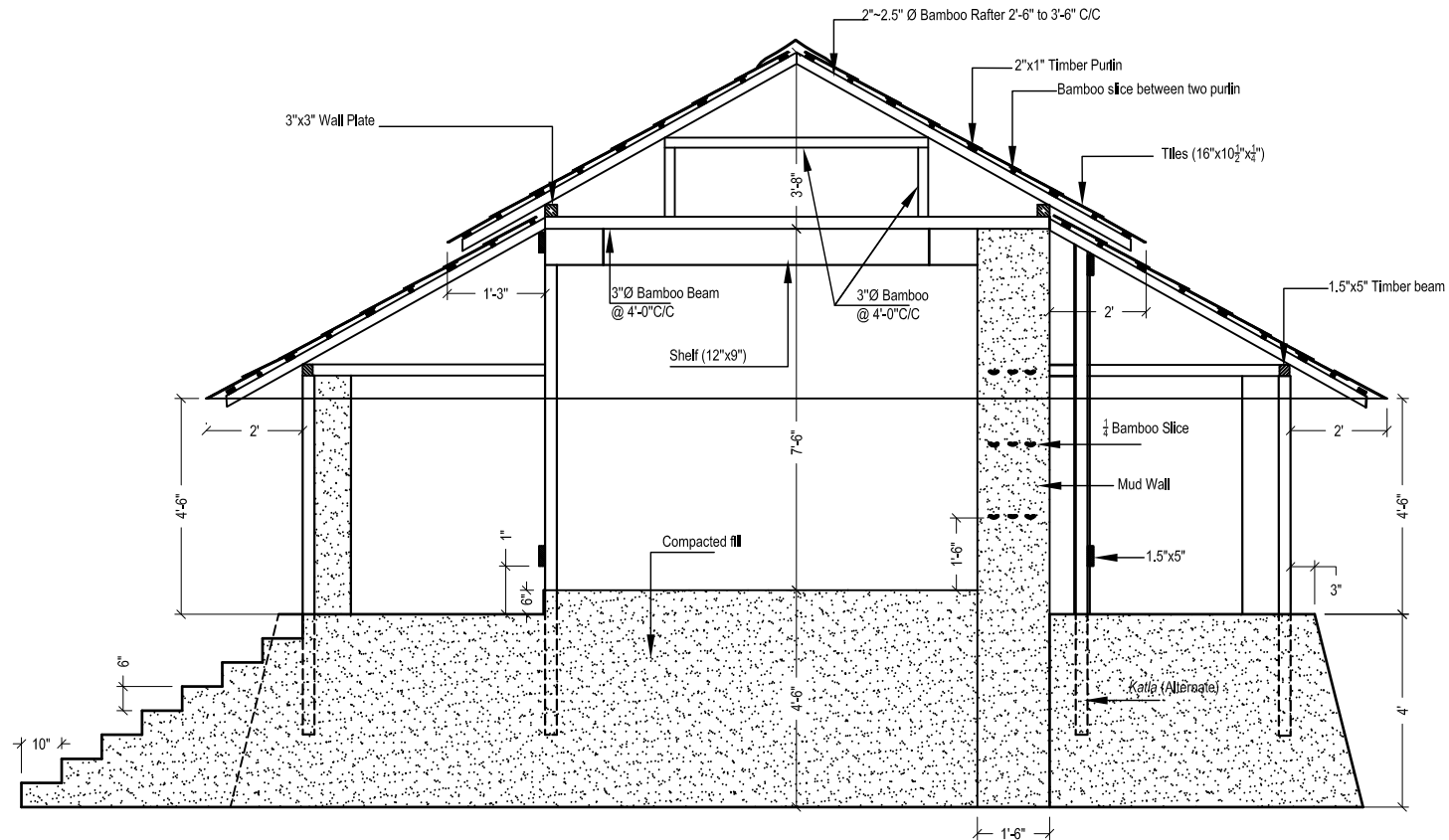
Fence/Wall: Mud wall

Bracing: Corner bracing

Cost: Tk. 120,000







SECTION: A - A

1/4 Bamboo Slice

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: ASSASUNI, SATKHIRA

TYPE 1 : Clay Tiled Roof with Mud Wall

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAtterre  
Grenoble, France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAtterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

Md. ABU SAYED RASHED

CLIENT

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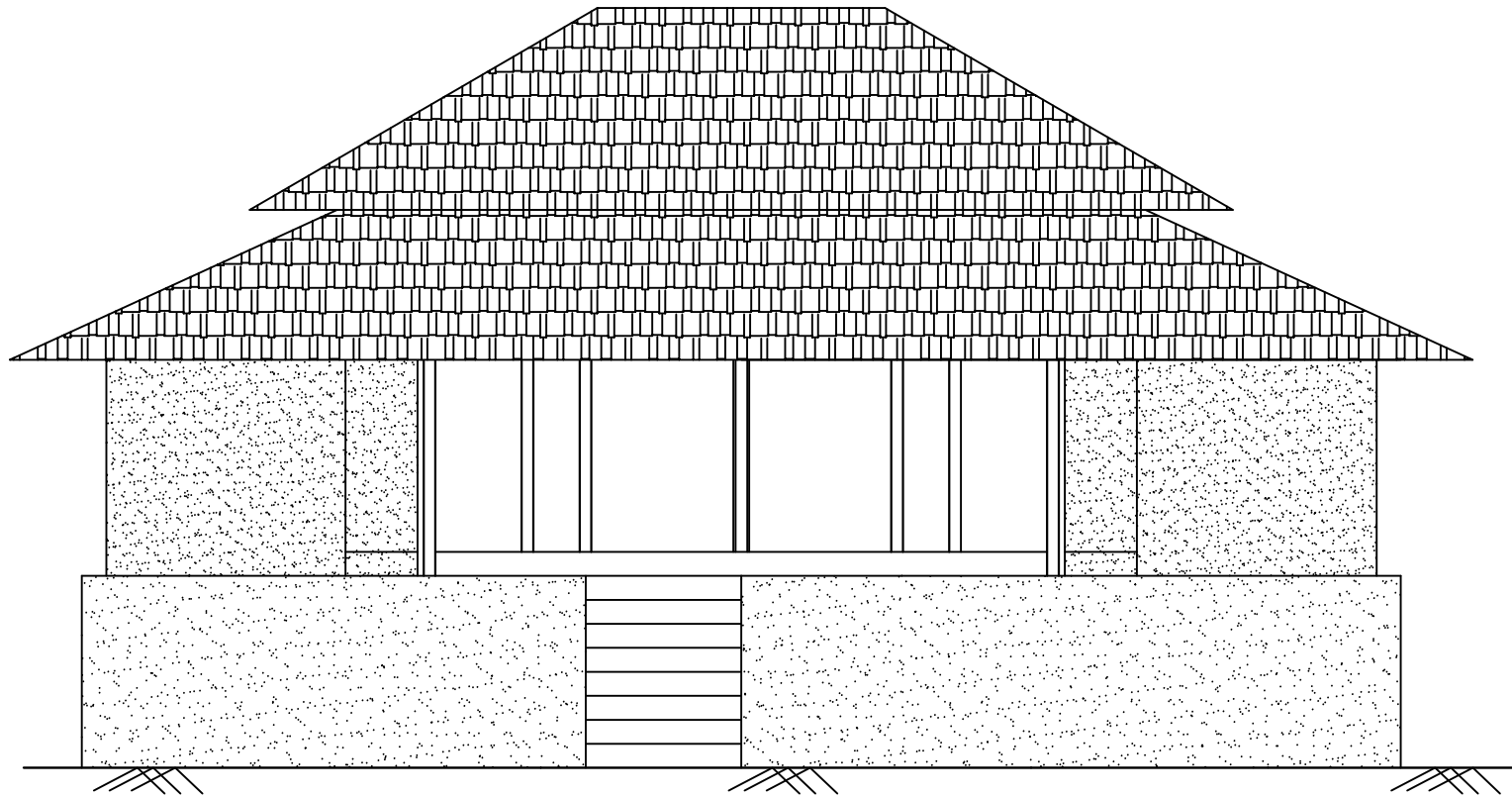
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SECTION: A - A

JULY 2015

SHEET NO:

S - 02



FRONT ELEVATION

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: ASSASUNI, SATKHIRA

TYPE 1 : Clay Tiled Roof with Mud Wall

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAtterre  
Grenoble, France

DESIGN BY:

BUET

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CRAtterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

Md. ABU SAYED RASHED

CLIENT

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BANGLADESH

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CARITAS  
LUXEMBOURG

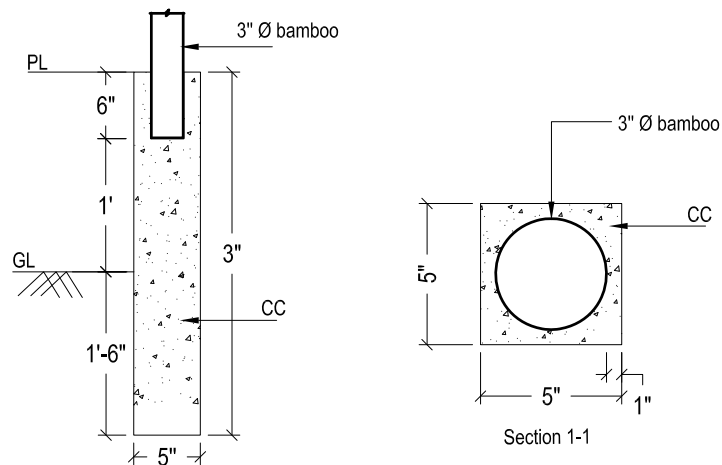
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SECTION: Z-Z

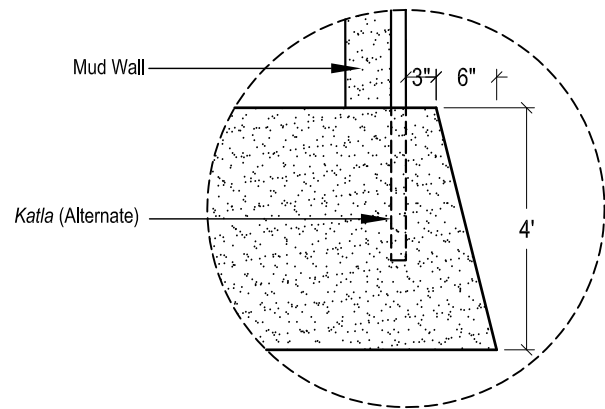
JULY 2015

SHEET NO:

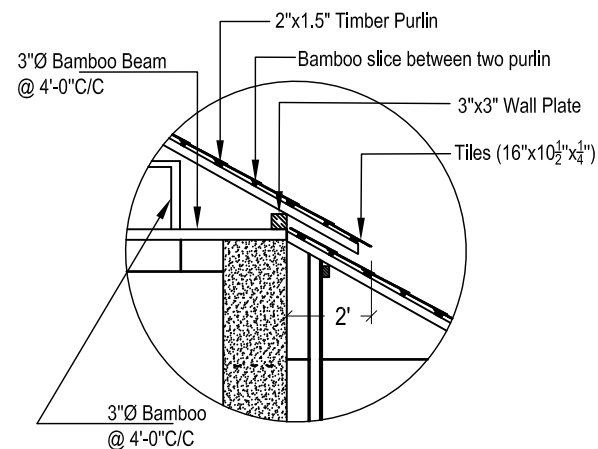
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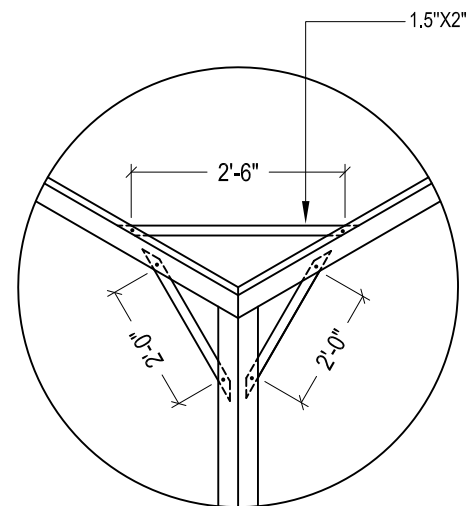
Detail 01: Bamboo into C C Katla



Detail 02: Plinth



Detail 07: Corner Bracing and Roof Arrangement



Detail 04: Corner Bracing

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: ASSASUNI, SATKHIRA

TYPE 1 : Clay Tiled Roof with Mud Wall

CONSULTANTS



DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESH



ENSAG-CRAterre  
Grenoble, France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

Md. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES



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BANGLADESH



CARITAS FRANCE



CARITAS  
LUXEMBOURG

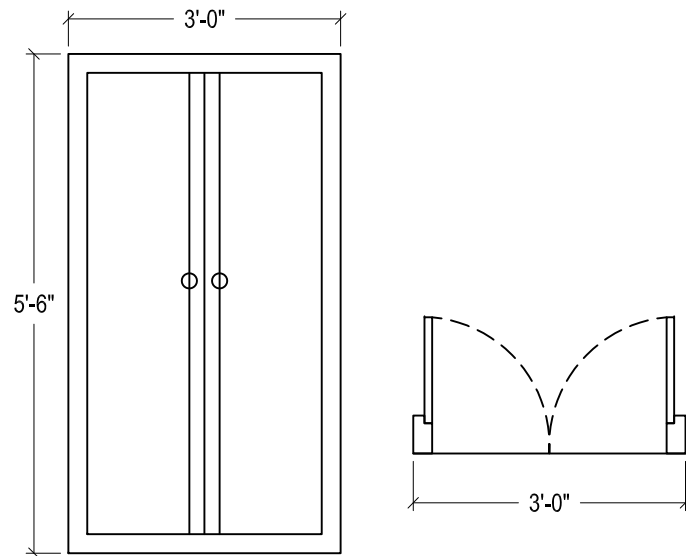
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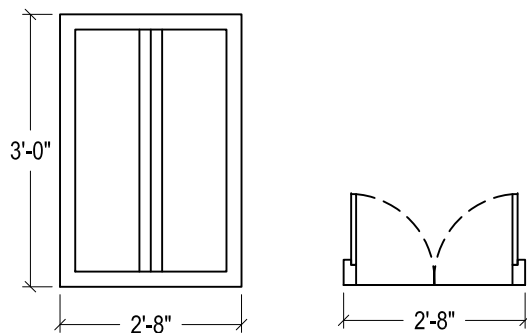
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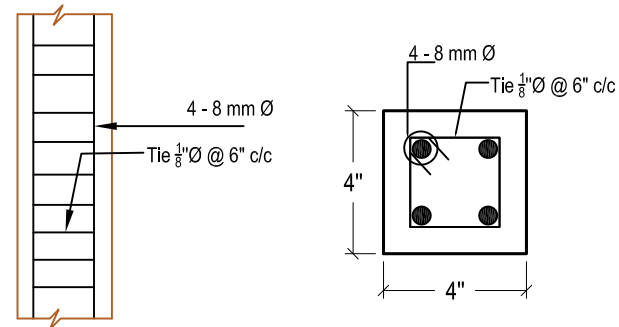
S - 04



Detail 05: Door

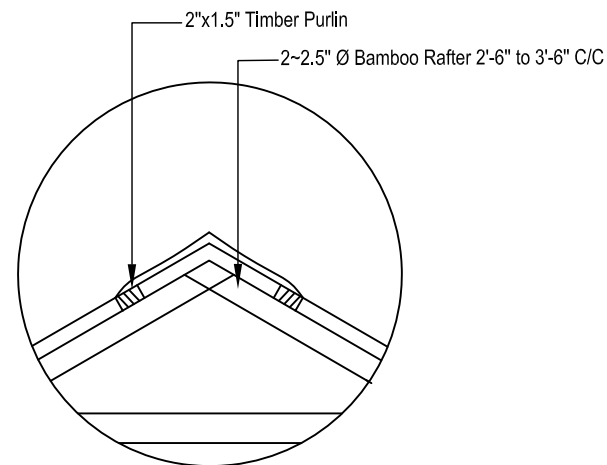


Detail 06: Window

**NOTE :**

- Concrete - 1 : 2 : 4
- Aggregate - Brick Chips
- Sylhet Sand
- Reinforcement - 60 Grade
- Clear Cover -  $\frac{3}{4}$  "

Detail 07: Post (Long Section &amp; Cross Section)



Detail 08: Roof

**PROJECT NAME :****CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)**

LOCATION: ASSASUNI, SATKHIRA

TYPE 1 : Clay Tiled Roof with Mud Wall

**CONSULTANTS**DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRATERRE  
Grenoble, France**DESIGN BY:**

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRATERRE

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

**DRAWN BY:**

Md. ABU SAYED RASHED

**CLIENT****FUNDING AGENCIES**CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG**DRAWING TITLE:**

DETAIL

JULY 2015

**SHEET NO:**

S - 05

MEMBER SCHEDULE				
SL.	ITEMS NAME	DIMENSIONS	MATERIALS NAME	REMARKS
1.	Roof Tiles	16"x10.5"x0.25"	Clay Tiles	
2.	Purlin	2"x1.5"	Timber	@ 5" c/c & bamboo slice between two purlins
3.	Rafter	2"~2.5" dia	Bamboo	@ 2'-6" to 3'-6" c/c
4.	Tie Beam	3" dia	Bamboo	@ 4'-0" c/c
5.	Wall Plate	3" dia	Bamboo	
6.	Beam	4"x3"	Timber	
7.	Mud Wall	1'-6"	Mud	
8.	Main Post	3" dia	Bamboo	
9.	Fence Supporting Post	2" dia	Bamboo	
11.	Corner Post	4"x4"x11'-0"	RC	4-8 mm Ø 1:2:4 Concrete
12.	Door	3'-0"x6'-0"	Timber	Position may be Changed
13.	Window	2'-6"x3'-6"	Timber	Position may be Changed

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: ASSASUNI, SATKHIRA

TYPE 1 : Clay Tiled Roof with Mud Wall

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble, France

DESIGN BY:

BUET

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2. Prof. Dr. Mohammad Shariful Islam

CRAAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

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BANGLADESH

FUNDING AGENCIES



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CARITAS  
LUXENBOURG

DRAWING TITLE:

MEMBER SCHEDULE

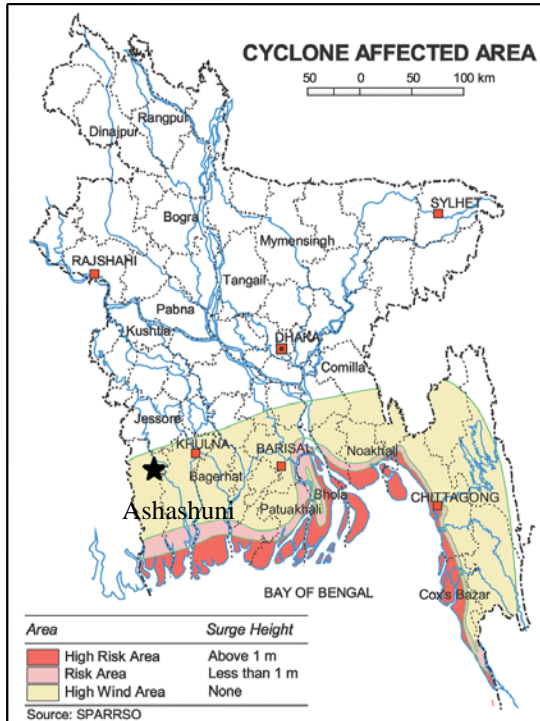
JULY 2015

SHEET NO:

S - 06

## DIVISION: KHULNA

### 3. DESIGN OF LCH IN ASHASHUNI: TYPE – 2



#### SITE TOPOGRAPHY



#### General Information:

##### Location:

District: Satkhira

Upazila: Ashashuni

Union: Sadar

Mouza/ Village: Hashkhali

##### Climatic Feature: Saline

Avg. Maximum Temperature: 35.5 °C

Avg. Minimum temperature: 12.5°C

Annual Rainfall: 1710 mm

Average Relative Humidity: 76%

##### Geotechnical Feature:

Topography: Plain land near river bank

MSL: 3 m

Soil Characteristics: Silt

##### Disaster:

Tidal surge, Cyclone and tidal surge, River Flood, Strong Wind



Completed House

#### Design Considerations:

Available Building Materials: Mud, Bamboo, RC post, CGI sheets, Tiles, *Golpata*, Wood etc

Foundation: Bamboo posts/ *katla* embedded in soil (1-2 ft)

Plinth: Mud (two/three steps)

Post: RC posts at the corners of outer periphery + Treated bamboo on *katla*

Openings: 1 main door & open veranda at three sides

Ceiling: Ceiling is considered to protect heat and cold

Joints: Nails, notches, GI wire

Roof Type: Four pitched & Veranda roof is disconnected from main roof

Roof cover: *Gol pata*

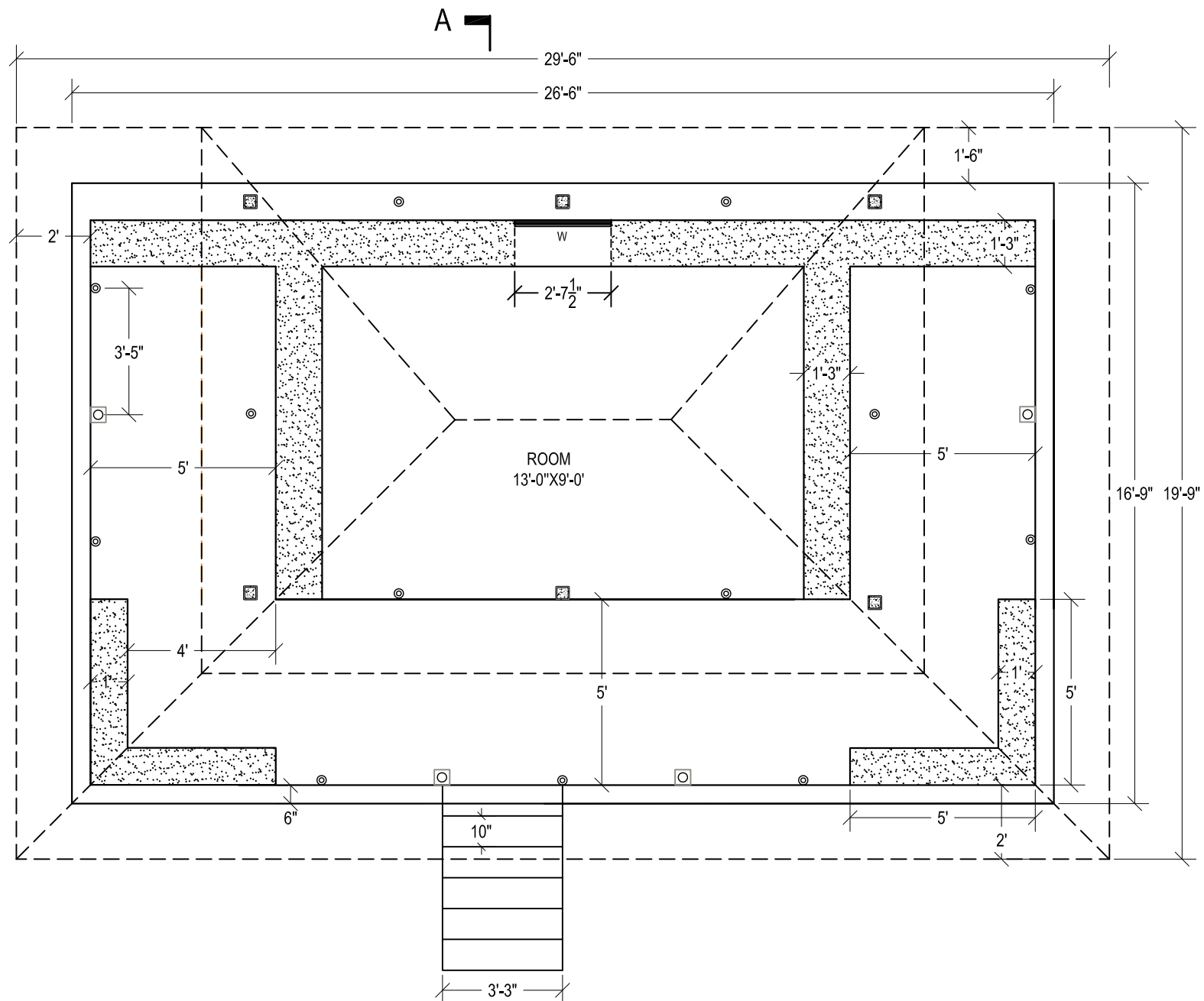
Fence/Wall: Mud wall

Roof structure: Wooden/ bamboo truss

Bracing: Corner bracing

Cost: Tk. 85,000





- 5' x 5' RC Post  
 3' Ø Bamboo post  
 5'x5' Katta post with 3' Ø Bamboo post

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: ASSASUNI, SATKHIRA

TYPE 2 : Clay Tiled Roof with Mud Wall

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAtterre  
Grenoble, France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAtterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

Md. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

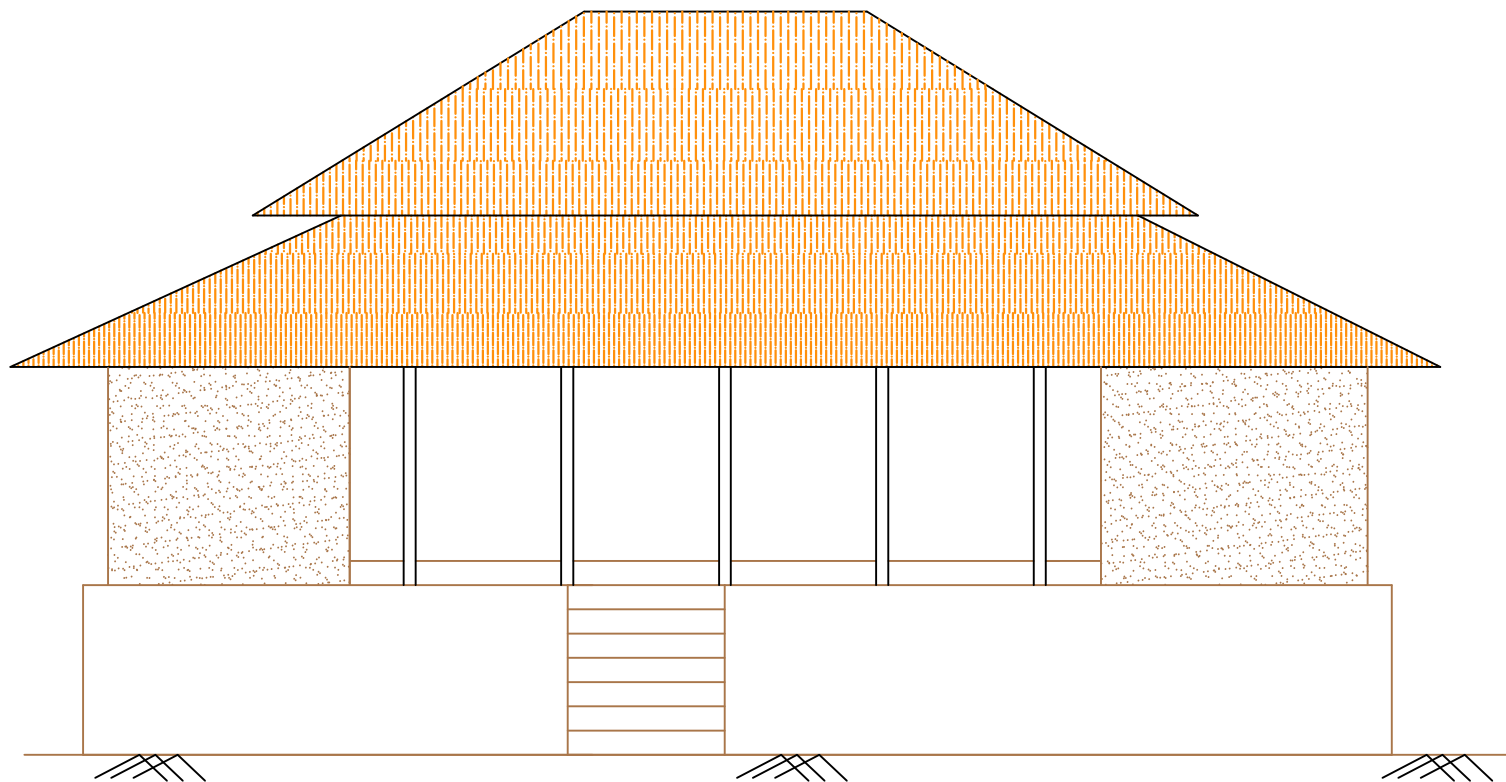
PLAN

JULY 2015

SHEET NO:

S - 01





FRONT ELEVATION

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: ASSASUNI, SATKHIRA

TYPE 2 : Clay Tiled Roof with Mud Wall

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

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CARITAS  
LUXEMBOURG

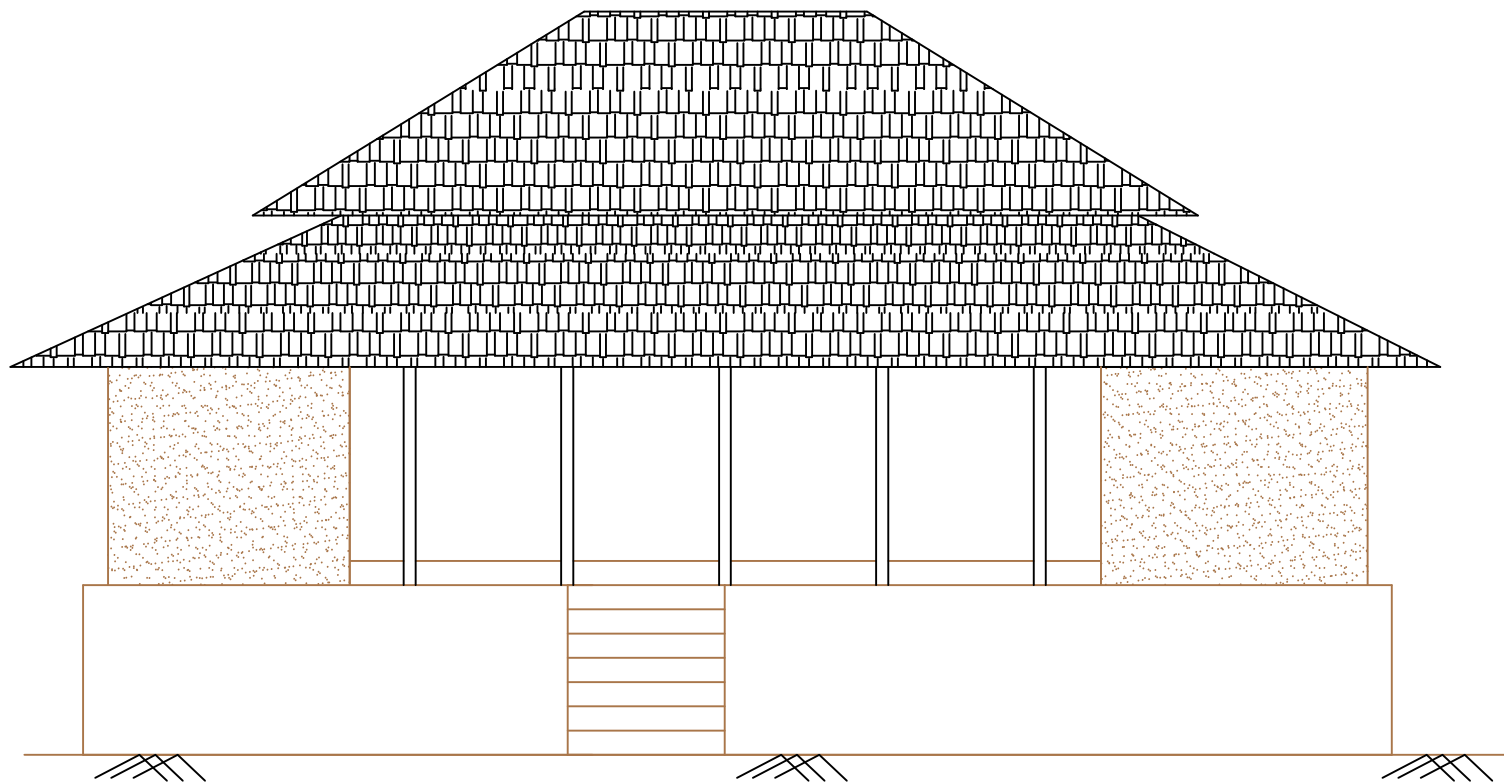
DRAWING TITLE:

FRONT ELEVATION

JULY 2015

SHEET NO:

S - 03



FRONT ELEVATION

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: ASSASUNI, SATKHIRA

TYPE 2 : Clay Tiled Roof with Mud Wall

CONSULTANTS

DEPARTMENT OF  
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BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

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CRAterre

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Caritas, Bangladesh

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LUXEMBOURG

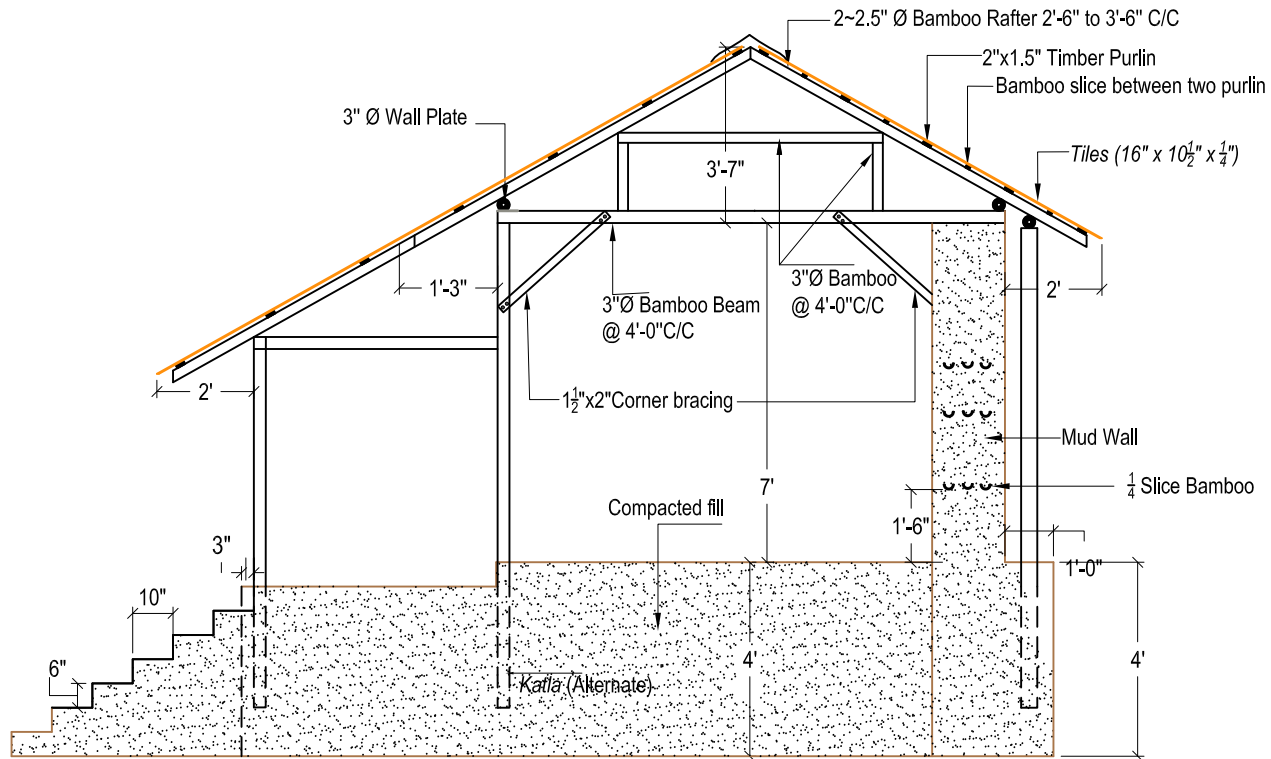
DRAWING TITLE:

FRONT ELEVATION

JULY 2015

SHEET NO:

S - 03



SECTION: A - A

PROJECT NAME :

### CONSTRUCTION OF PILOT LOW COST HOUSES (LCH)

LOCATION: ASSASUNI, SATKHIRA

TYPE 2 : Clay Tiled Roof with Mud Wall

CONSULTANTS



DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESH

ENSAG-CRAterre  
G, Grenoble , France

DESIGN BY:

BUET

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2. Prof. Dr. Mohammad Shariful Islam

CRAterre

- ### 3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

Md. ABU SAYED RASHED

CLIENT



CARITAS  
BANGLADESH

FUNDING AGENCIES
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CARITAS  
LUXEMBOURG

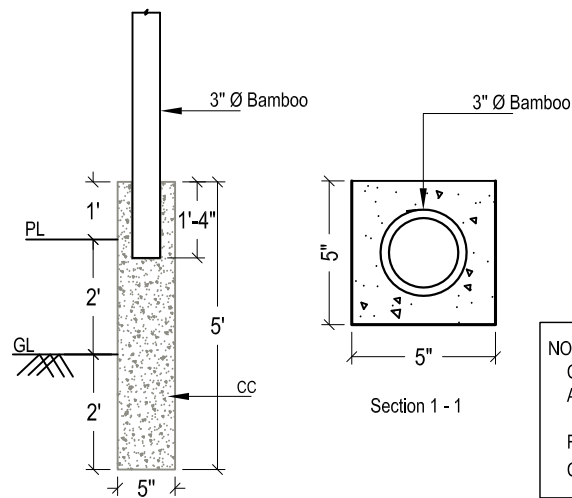
DRAWING TITLE:

SECTION: A - A

JULY 2015

SHEET NO:

S - 02



NOTE :

Concrete - 1 : 2 : 4

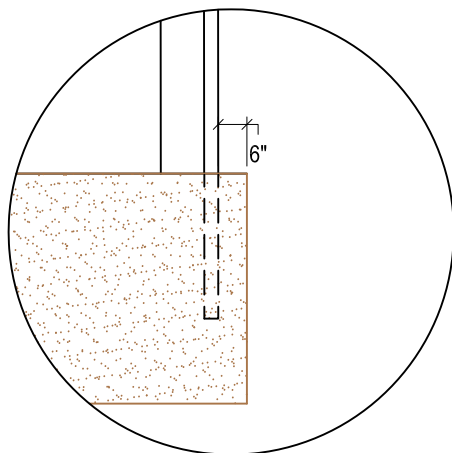
Aggregate - Brick Chips

- Sylhet Sand

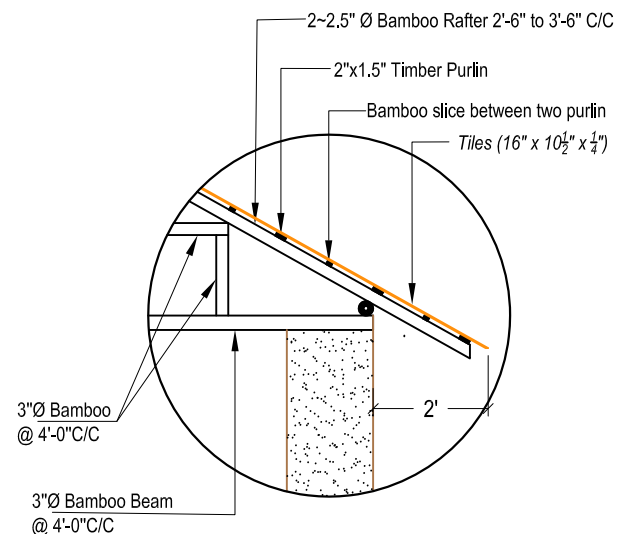
Reinforcement - 60 Grade

Clear Cover -  $\frac{3}{4}$ "

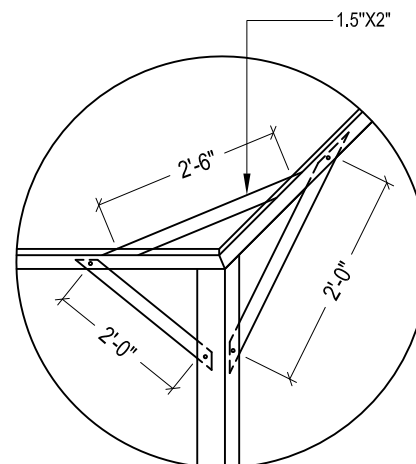
Detail 01: Concrete with Katla



Detail 02: Plinth



Detail 03: Corner and roof aragement



Detail 04: Corner Bracing

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: ASSASUNI, SATKHIRA

TYPE 2 : Clay Tiled Roof with Mud Wall

CONSULTANTS



DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESH



ENSAG-CRATERRE  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain  
2. Prof. Dr. Mohammad Shariful Islam

CRATERRE

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

Md. ABU SAYED RASHED

CLIENT

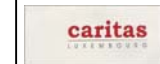
FUNDING AGENCIES



CARITAS  
BANGLADESH



CARITAS FRANCE



CARITAS  
LUXEMBOURG

DRAWING TITLE: Type-2

DETAIL

JULY 2015

SHEET NO:

S - 04

MEMBER SCHEDULE				
SL.	ITEMS NAME	DIMENSIONS	MATERIALS NAME	REMARKS
1.	Purlin	1.5"X2"	Bamboo	
2.	Rafter	2.5"X2"	Timber	2"~2.5"Ø Bamboo Rafter in alternate row
3.	Tie Beam	2.5"X3.5"	Timber	3' Ø Bamboo alternative
4.	Window	2'-6"x3'-6"	Timber	Position may be Changed
5.	Door	3'-0"x6'-0"	Timber	Position may be Changed
6.	Tiles (Roof)	0.32 mm	Tiles	
8.	Top tie	2"x1.5"	Timber	2" Ø Bamboo in alternate row
9.	Main Post	3" dia	Bamboo	
10.	Fence Supporting Post	2" dia	Bamboo	
11.	Corner Rafter	3"x2"	Timber	
12.	Corner Post	4"x4"x11'-0"	RCC (4-10 mm Steel)	Ratio=1:2:4
14.	Angle Bar	1.5"x0.25"x1'-6"	Steel	10" in concrete, 8" open to joint bolt
15.	Mud wall	10"x3"	Mud	Depth of wall variable

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: ASSASUNI, SATKHIRA

TYPE 2 : Clay Tiled Roof with Mud Wall

## CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

## DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain  
2. Prof. Dr. Mohammad Shariful Islam

CRAAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

## DRAWN BY:

MD. ABU SAYED RASHED

## CLIENT

CARITAS  
BANGLADESH

## FUNDING AGENCIES



CARITAS FRANCE

CARITAS  
LUXENBOURG

## DRAWING TITLE:

MEMBER SCHEDULE

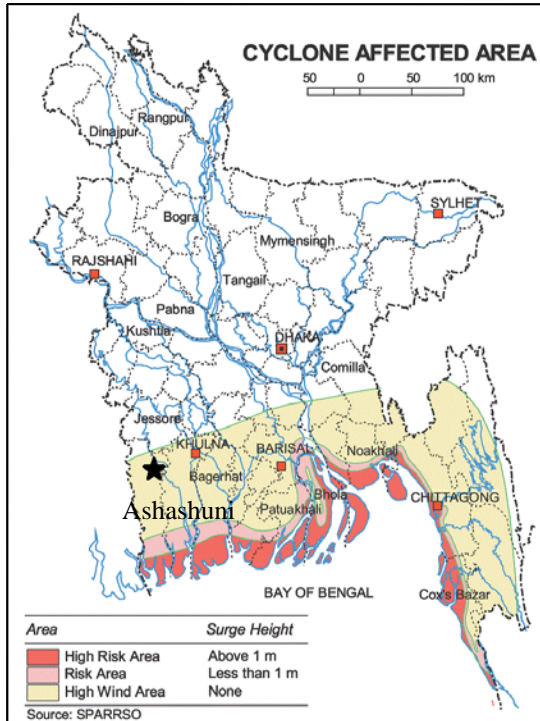
JULY 2015

SHEET NO:

S - 05

## DIVISION: KHULNA

### 4. DESIGN OF LCH IN ASHASHUNI: TYPE – DP 1



#### SITE TOPOGRAPHY



#### General Information:

##### Location:

District: Satkhira

Upazila: Ashashuni

Union: Sadar

Mouza/ Village: Hashkhali

##### Climatic Feature: Saline

Avg. Maximum Temperature: 35.5 °C

Avg. Minimum temperature: 12.5°C

Annual Rainfall: 1710 mm

Average Relative Humidity: 76%

##### Geotechnical Feature:

Topography: Plain land near river bank

MSL: 3 m

Soil Characteristics: Silt

##### Disaster:

Tidal surge, Cyclone and tidal surge, River Flood, Strong Wind



Completed House

#### Design Considerations:

Available Building Materials: Mud, Bamboo, RC post, CGI sheets, Tiles, *Golpata*, Wood etc

Foundation: Bamboo posts/ *katla* embedded in soil (1-2 ft)

Plinth: Mud (two/three steps)

Post: RC posts at the corners of outer periphery + Treated bamboo on *katla*

Fence/Wall: *Tati* (bamboo sticks with mud plaster)

Openings: 1 main door & open veranda at three sides

Ceiling: Ceiling is considered to protect heat and cold

Joints: Nails, notches, GI wire

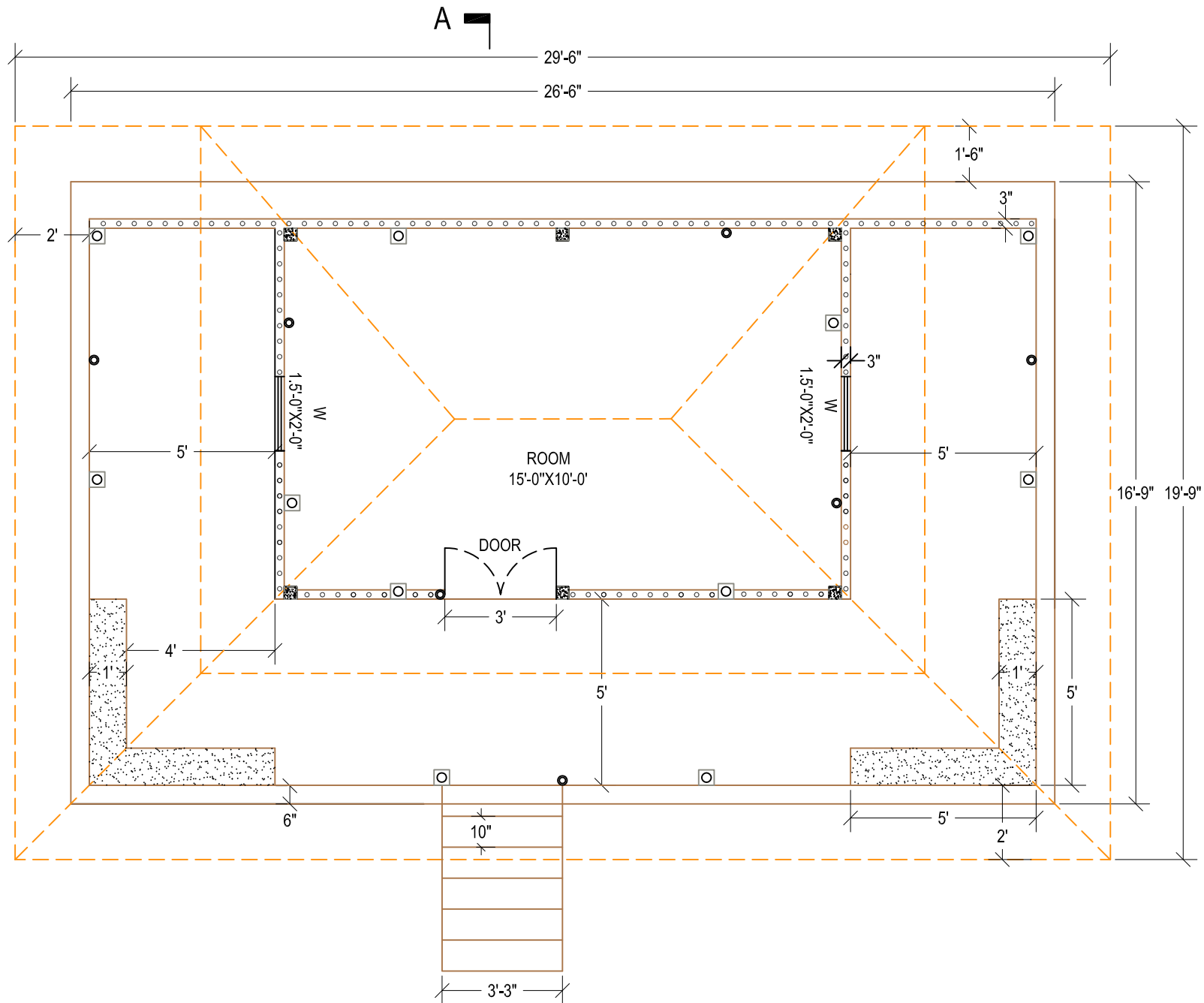
Roof Type: Four pitched and Veranda  
roof is disconnected from main roof

Roof cover: *Gol pata*

Roof structure: Wooden/ bamboo truss






Bracing: Corner bracing

Cost: Tk. 85,000

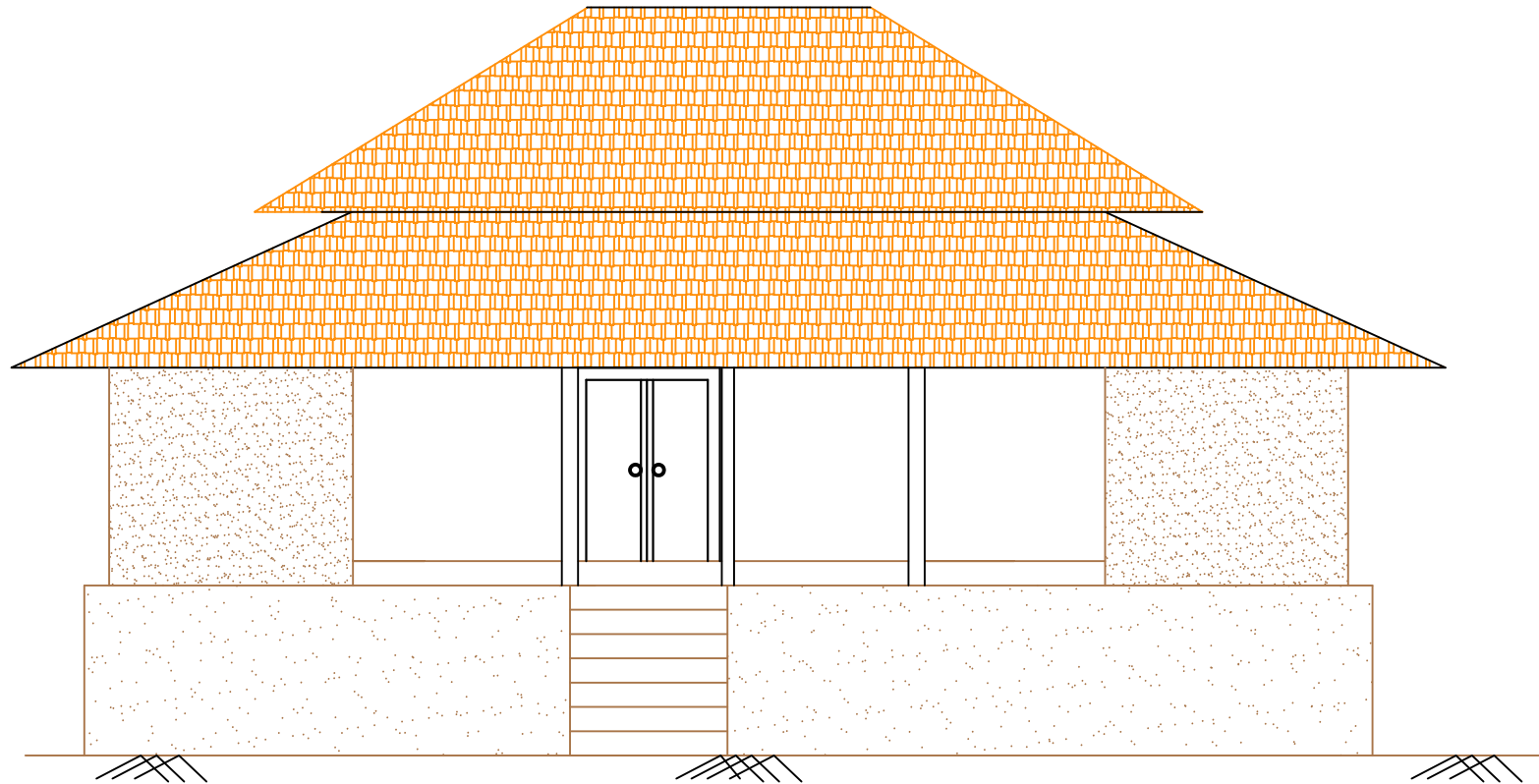


PLAN

- 5"x5" R.C. Post
- 3"Ø Bamboo Post
- 5"x5" R.C. *katla* with Bamboo Post

PROJECT NAME :	
CONSTRUCTION OF PILOT LOW COST HOUSES (LCH)	
LOCATION: ASSASUNI, SATKHIRA	
TYPE DP-1 : Goolpata Roof with Tati Wall	
CONSULTANTS	
 <p>DEPARTMENT OF CIVIL ENGINEERING, BRTC, BUET, DHAKA BANGLADESH</p>	 <p>ENSAG-CRAterre Grenoble , France</p>
DESIGN BY:	
<u>BUET</u> 1. Prof. Dr. Tahsin Reza Hossain 2. Prof. Dr. Mohammad Shariful Islam  <u>CRAterre</u> 3. Engr. Olivier Moles  <u>Caritas, Bangladesh</u> 1. Mr. Ratan Kumar Podder	
DRAWN BY :	
Md. ABU SAYED RASHED	
CLIENT	FUNDING AGENCIES
 <p>CARITAS BANGLADESH</p>	 <p>CARITAS FRANCE</p>  <p>CARITAS LUXEMBOURG</p>
DRAWING TITLE:	
PLAN	
JULY 2015	SHEET NO: S - 01





FRONT ELEVATION

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: ASSASUNI, SATKHIRA

TYPE DP-1 : Goolpata Roof with Tati Wall

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

Md. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

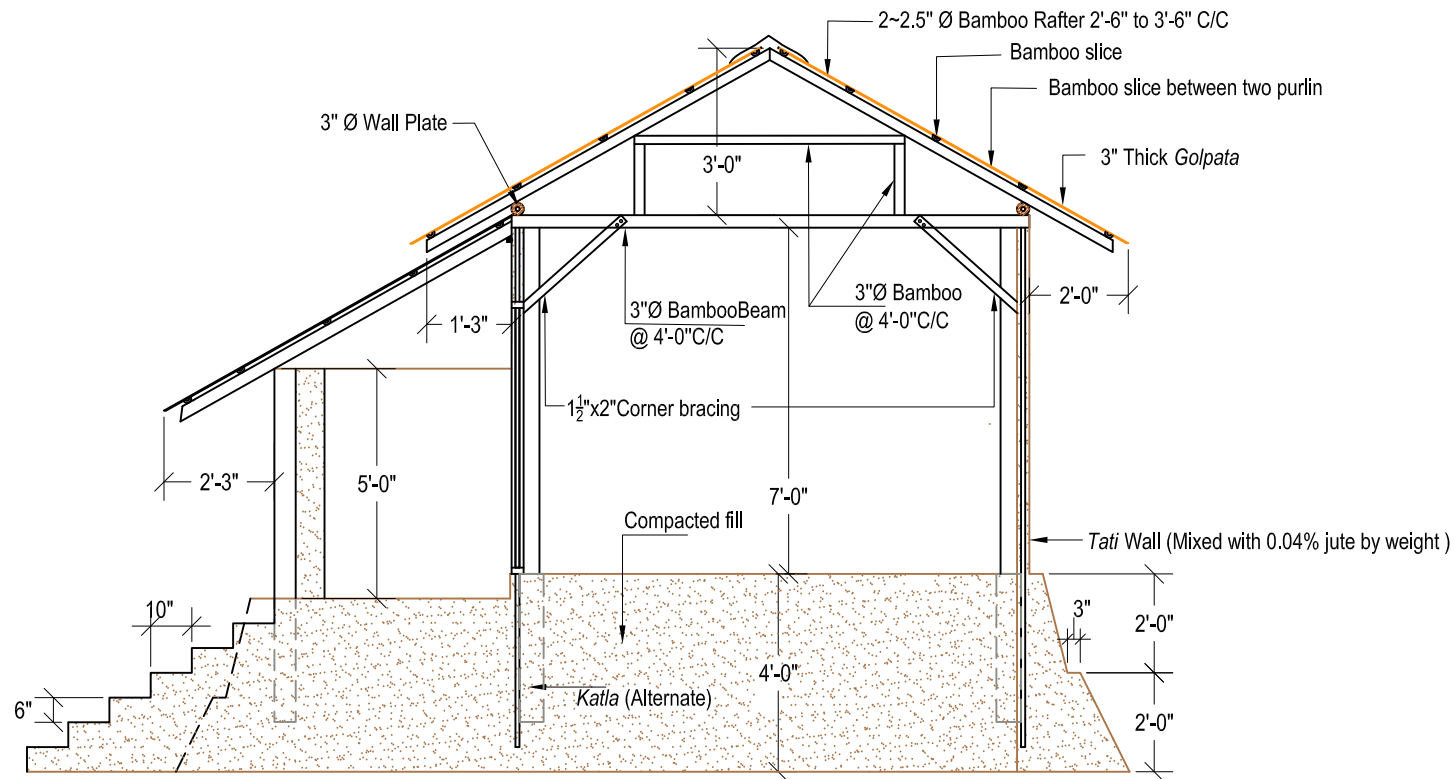
DRAWING TITLE:

FRONT ELEVATION






JULY 2015

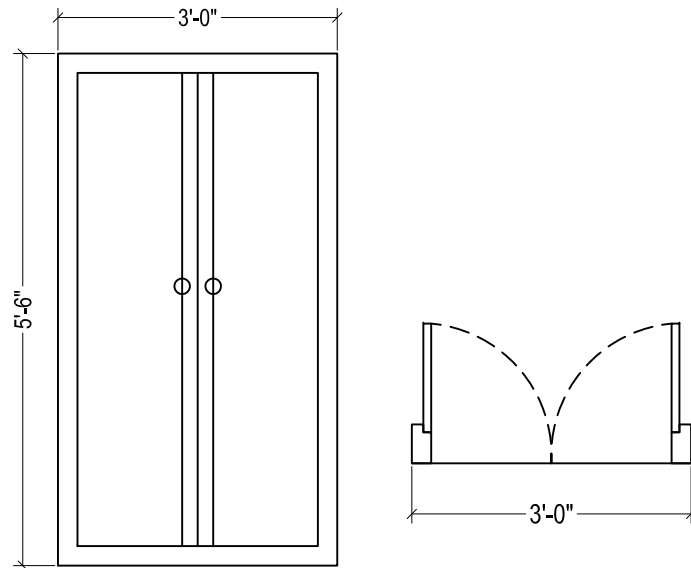
SHEET NO:

S - 03

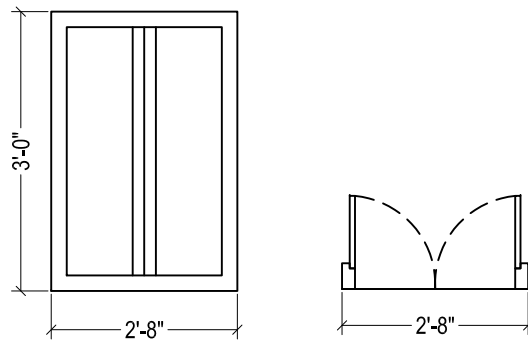


SECTION: A - A

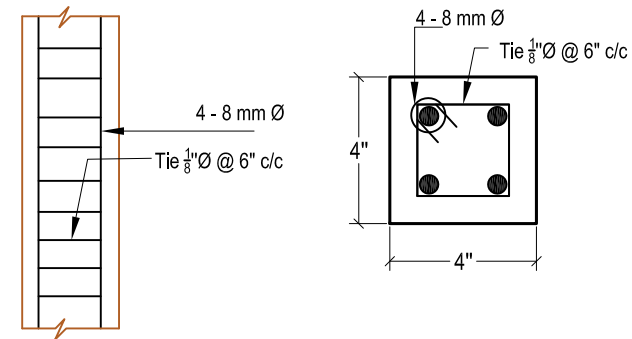
PROJECT NAME :	
CONSTRUCTION OF PILOT LOW COST HOUSES (LCH)	
LOCATION: ASSASUNI, SATKHIRA	
TYPE DP-1 : Goolpata Roof with Tati Wall	
CONSULTANTS	
 <p>DEPARTMENT OF CIVIL ENGINEERING, BRTC, BUET, DHAKA BANGLADESH</p>	 <p>ENSAG-CRATERRE Grenoble , France</p>
DESIGN BY:	
<p>BUET</p> <p>1. Prof. Dr. Tahsin Reza Hossain</p> <p>2. Prof. Dr. Mohammad Shariful Islam</p> <p>CRATERRE</p> <p>3. Engr. Olivier Moles</p> <p>Caritas, Bangladesh</p> <p>1. Mr. Ratan Kumar Podder</p>	
DRAWN BY :	
Md. ABU SAYED RASHED	
CLIENT	FUNDING AGENCIES
 <p>CARITAS BANGLADESH</p>	 <p>CARITAS FRANCE</p>  <p>CARITAS LUXEMBOURG</p>
DRAWING TITLE:	
SECTION: A - A	
JULY 2015	SHEET NO: S - 02



Detail 05: Door



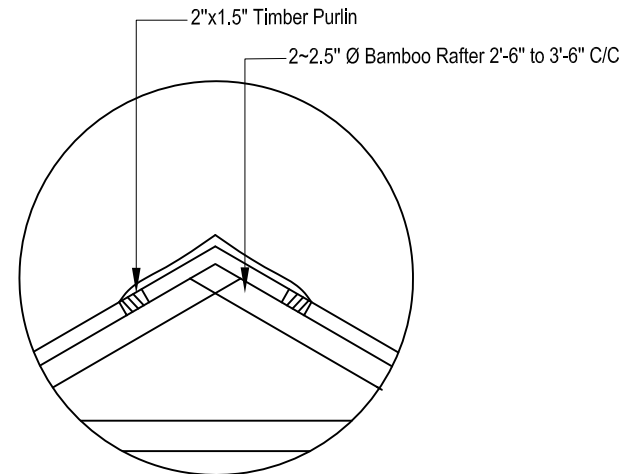
Detail 06: Window



NOTE :

Concrete - 1 : 2 : 4  
Aggregate - Brick Chips  
Sylhet Sand  
Reinforcement - 60 Grade  
Clear Cover - 3/4"

Detail 07: Post (Long Section & Cross Section)



Detail 08: Roof Top

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: ASSASUNI, SATKHIRA

TYPE DP-1 : Goolpata Roof with Tati Wall

CONSULTANTS



DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESH



ENSAG-CRAtterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain  
2. Prof. Dr. Mohammad Shariful Islam

CRAtterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

Md. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES



CARITAS  
BANGLADESH



CARITAS FRANCE



CARITAS  
LUXEMBOURG

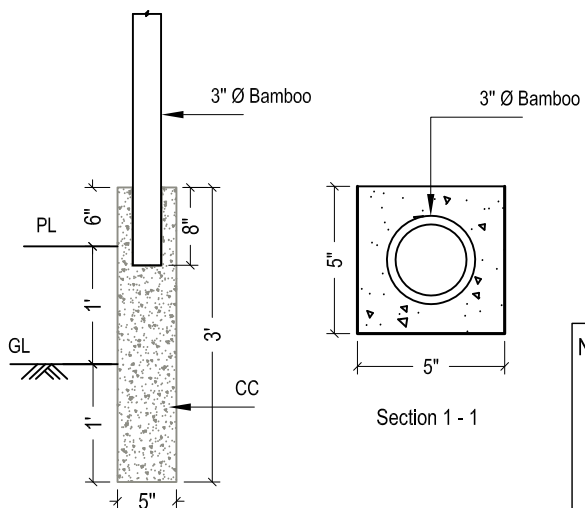
DRAWING TITLE:

DETAILS

JULY 2015

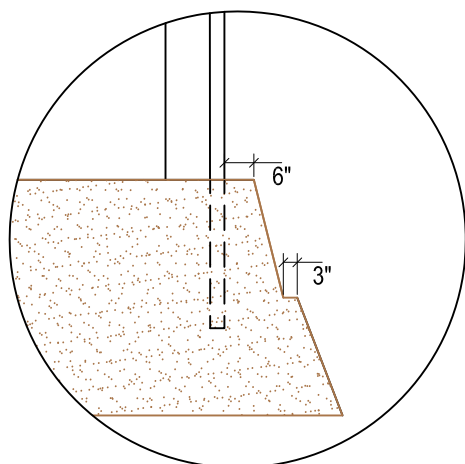
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S - 05

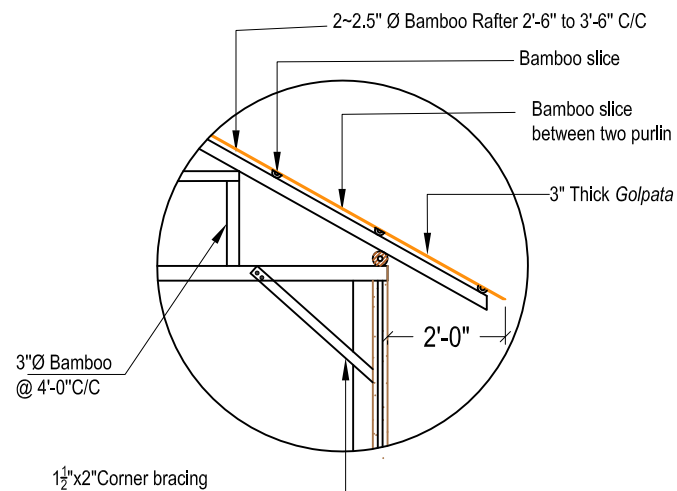


**NOTE :**  
Concrete - 1 : 2 : 4  
Aggregate - Brick Chips  
- Sylhet Sand  
Reinforcement - 60 Grade  
Clear Cover -  $\frac{3}{4}$ "

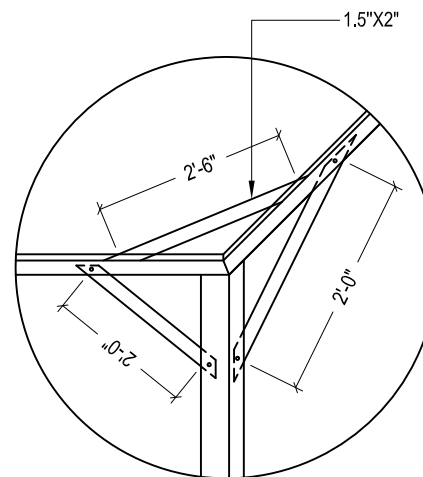
Detail 01: Concrete with Katla








Detail 02 : Plinth



Detail 03 : Corner



Detail 04 : Corner Bracing

<b>PROJECT NAME :</b>	
<b>CONSTRUCTION OF PILOT LOW COST HOUSES (LCH)</b>	
LOCATION: ASSASUNI, SATKHIRA	
TYPE DP-1 : Goolpata Roof with Tati Wall	
<b>CONSULTANTS</b>	
 DEPARTMENT OF CIVIL ENGINEERING, BRTC, BUET, DHAKA BANGLADESH	 ENSAG-CRAtterre Grenoble , France
<b>DESIGN BY:</b>	
<u>BUET</u> 1. Prof. Dr. Tahsin Reza Hossain 2. Prof. Dr. Mohammad Sharif Islam  <u>CRAtterre</u> 3. Engr. Olivier Moles	
<u>Caritas, Bangladesh</u> 1. Mr. Ratan Kumar Podder	
<b>DRAWN BY :</b>	
Md. ABU SAYED RASHED	
<b>CLIENT</b>	<b>FUNDING AGENCIES</b>
 CARITAS BANGLADESH	 CARITAS FRANCE   CARITAS LUXEMBOURG
<b>DRAWING TITLE:</b> Type-2	
<b>DETAILS</b>	
JULY 2015	<b>SHEET NO:</b> S - 04

MEMBER SCHEDULE				
SL.	ITEMS NAME	DIMENSIONS	MATERIALS NAME	REMARKS
1.	Purlin	1.5"x2"	Timber	
2.	Rafter	2.5"x2"	Timber	2"~2.5"Ø Bamboo Rafter in alternate row
3.	Tie Beam	2.5"x3.5"	Timber	3' Ø Bamboo alternative
4.	Window	2'-6"x3'-6"	Timber	Position may be Changed
5.	Door	3'-0"x6'-0"	Timber	Position may be Changed
6.	CGI Sheet (Roof)	0.32 mm	CGI Sheet	
8.	Top tie	2"x1.5"	Timber	2" Ø Bamboo in alternate row
9.	CGI Sheet Fence	0.20 mm	CGI Sheet	
10.	Main Post	3" dia	Bamboo	
11.	Fence Supporting Post	2" dia	Bamboo	
12.	Corner Rafter	3"x2"	Timber	
14.	Corner Post	4"x4"x11'-0"	RCC (4-10 mm Steel)	Ratio=1:2:4
15.	Angle Bar	1.5"x0.25"x1'-6"	Steel	10" in concrete, 8" open to joint bolt
16.	Brick guide wall	10"x3"	Brick Masonary	Depth of wall variable

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: ASSASUNI, SATKHIRA

TYPE DP-1 : Goolpata Roof with Tati Wall

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain  
2. Prof. Dr. Mohammad Shariful Islam

CRAAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXENBOURG

DRAWING TITLE:

MEMBER SCHEDULE

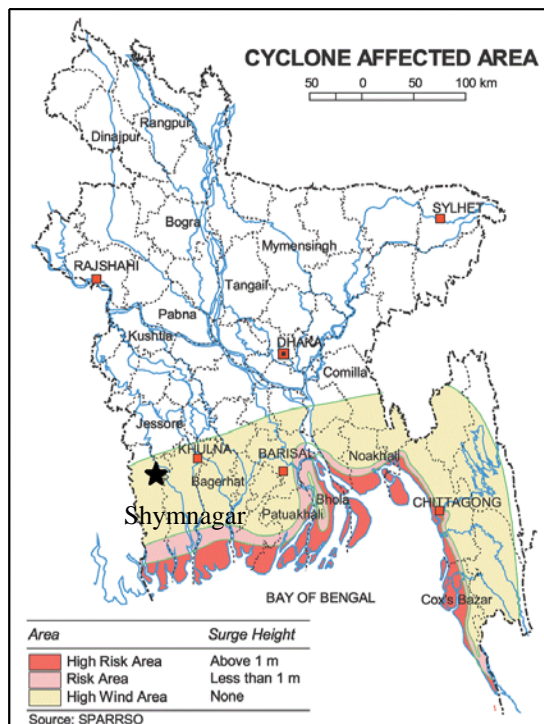
JULY 2015

SHEET NO:

S - 06

## DIVISION: KHULNA

### 5. DESIGN OF LCH IN SHYMNAGAR: TYPE – DP 2



#### General Information:

##### Location:

District: Satkhira

Upazila: Shymnagar

Union: Munshiganj

Mouza/ Village: Mothurapur (Jelepara)

##### Climatic Feature: Saline

Avg. Maximum Temperature: 35.5 °C

Avg. Minimum temperature: 12.5°C

Annual Rainfall: 1710 mm

Average Relative Humidity: 76%

##### Geotechnical Feature:

Topography: Plain land near river bank

MSL: 3 m

Soil Characteristics: Silt

##### Disaster:

Tidal surge, Cyclone and tidal surge, River Flood, Strong Wind



**Completed House**

#### Design Considerations:

Available Building Materials: Mud, Bamboo, RC post, CGI sheets, Tiles, *Golpata*, Wood etc

Foundation: Bamboo posts/ *katla* embedded in soil (1-2 ft)

Post: RC posts at the corners of outer periphery + Treated bamboo on *katla*

Fence/Wall: *Tati* (bamboo sticks with mud plaster)

Openings: 1 main door & open veranda at three sides

Ceiling: Ceiling is considered to protect heat and cold

Joints: Nails, notches, GI wire

Roof Type: Four pitched and Veranda

roof disconnected from main roof

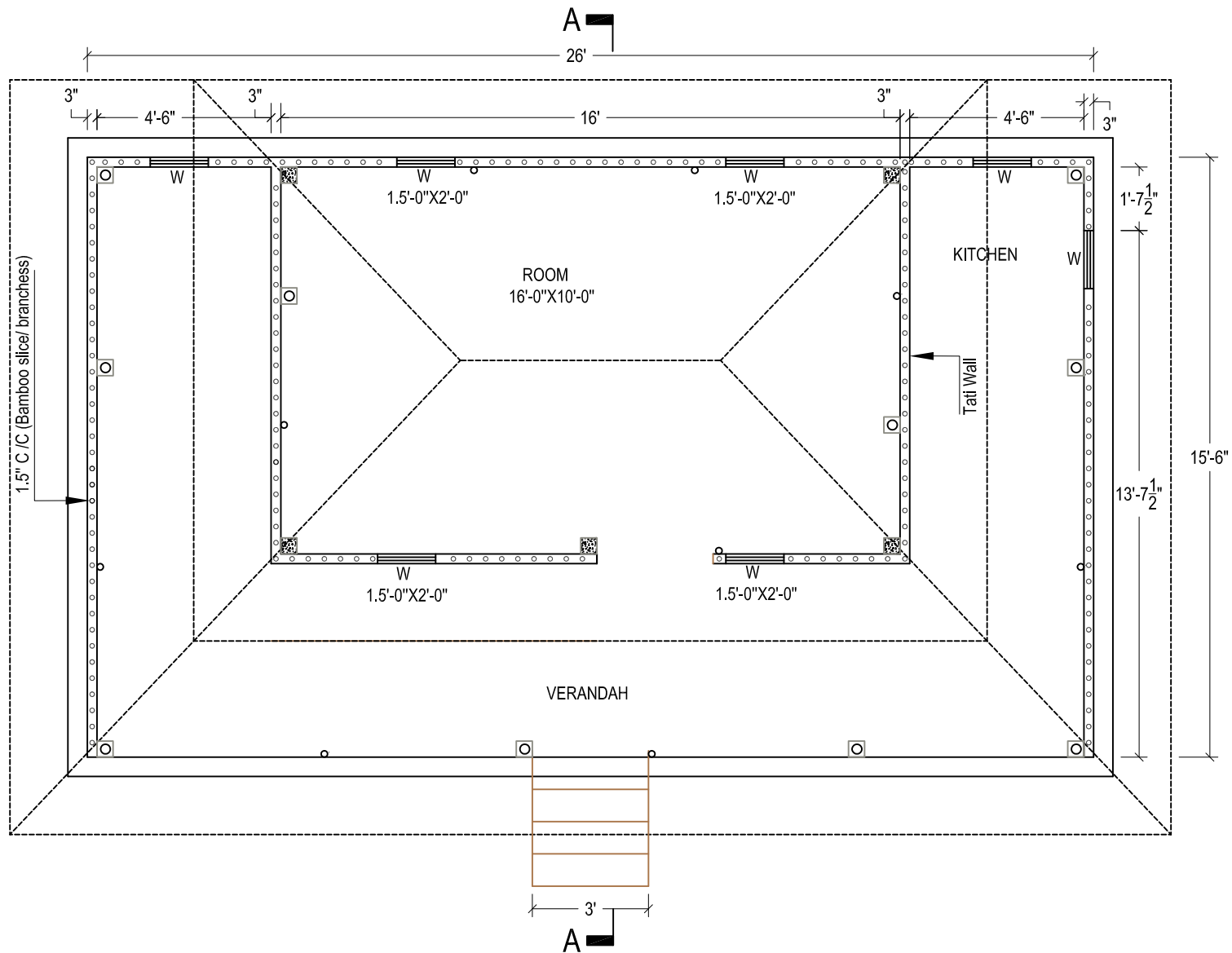
Plinth: Mud (two/three steps)

Roof cover: *Gol pata*

Roof structure: Wooden/ bamboo truss

Bracing: Corner bracing

Cost: Tk. 85,000



- 5'x5" - RC Post  
 5'x5" RC Katla with 3'Ø Bamboo  
 2" Dia Bamboo Post

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: SHYMNAGAR, MUNSHIGONJ

TYPE DP-2 : Golpata Roof with Tati Wall

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

Md. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

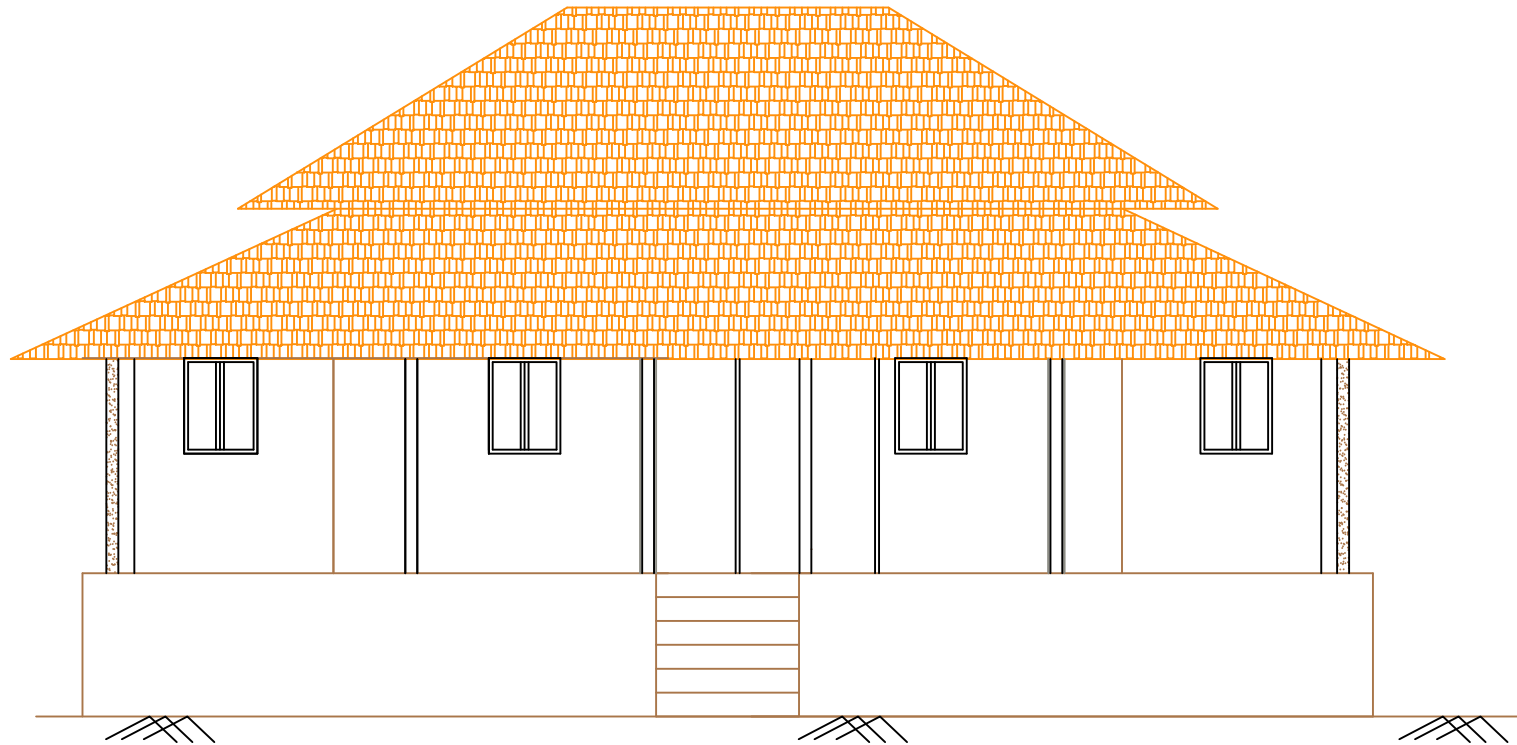
PLAN

July 2015

SHEET NO:

S - 01





FRONT ELEVATION

**PROJECT NAME :****CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)**

LOCATION: SHYMNAGAR, MUNSHIGONJ

TYPE DP-2 : Golpata Roof with Tali Wall

**CONSULTANTS**DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France**DESIGN BY:**

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

**DRAWN BY :**

Md. ABU SAYED RASHED

**CLIENT**CARITAS  
BANGLADESH**FUNDING AGENCIES**

CARITAS FRANCE

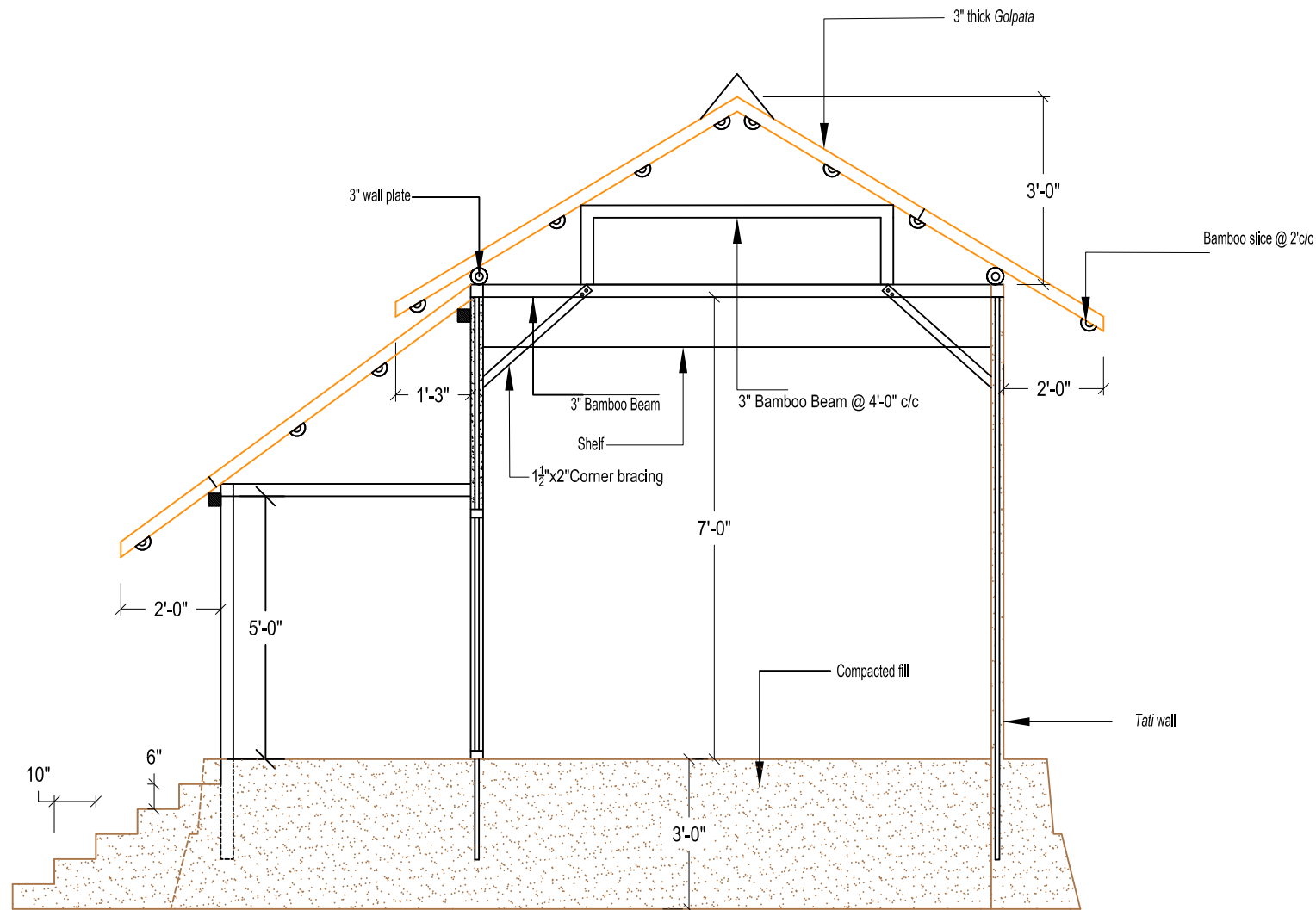
CARITAS  
LUXEMBOURG**DRAWING TITLE:**

FRONT ELEVATION

July 2015

**SHEET NO:**

S - 03



SECTION : A - A

## PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: SHYMNAGAR, MUNSHIGONJ

TYPE DP-2 : Golpata Roof with Tali Wall

## CONSULTANTS

DEPA  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRATERRE  
Grenoble, France

## DESIGN BY:

## BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

## CRATERRE

3. Engr. Olivier Moles

## Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

## DRAWN BY :

Md. ABU SAYED RASHED

## CLIENT

CARITAS  
BANGLADESH

## FUNDING AGENCIES



CARITAS FRANCE

CARITAS  
LUXEMBOURG

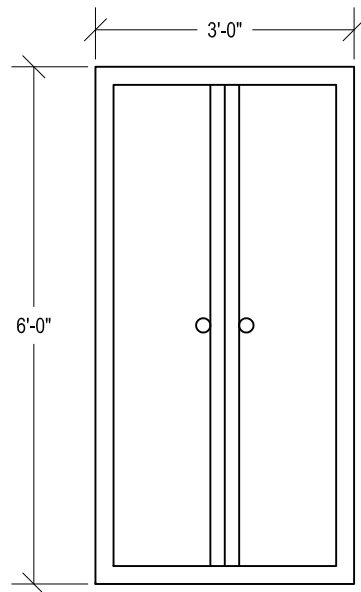
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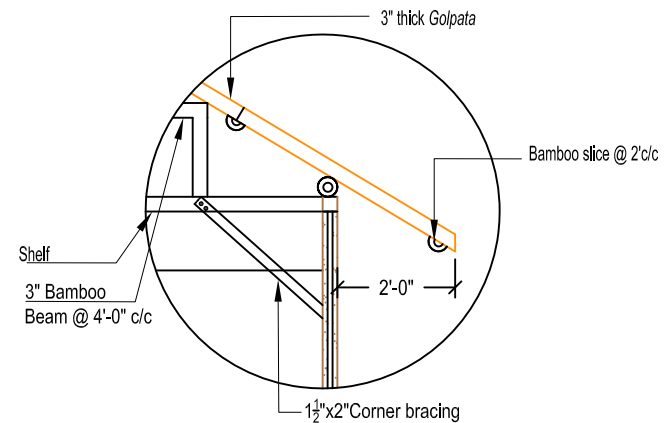
July 2015

SHEET NO:

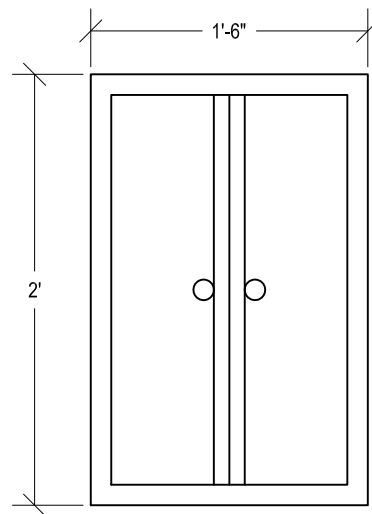
S - 02



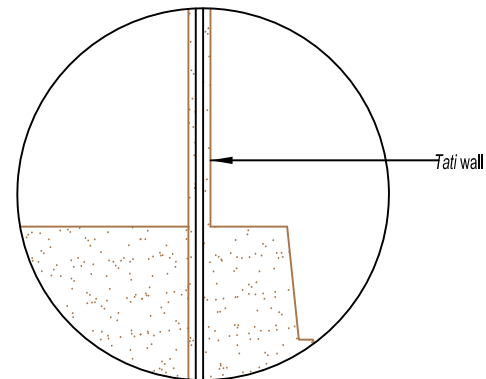
Detail 01: Door



Detail 03: Corner



Detail 02: Window



Detail 04: Tati Wall

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: SHYMNAGAR, MUNSHIGONJ

TYPE DP-2 : Golpata Roof with Tati Wall

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRATERre  
Grenoble , France

DESIGN BY:

BUET

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CRATERre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

Md. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

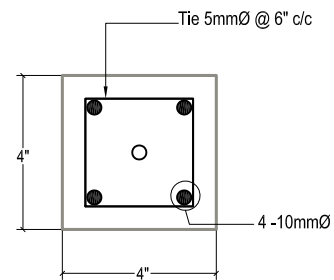
DRAWING TITLE:

DETAIL

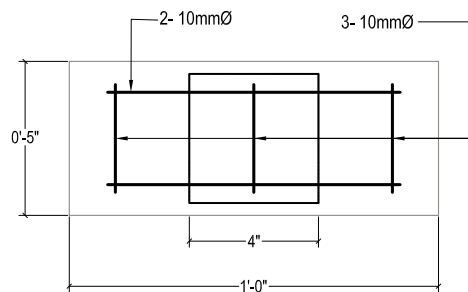
July 2015

SHEET NO:

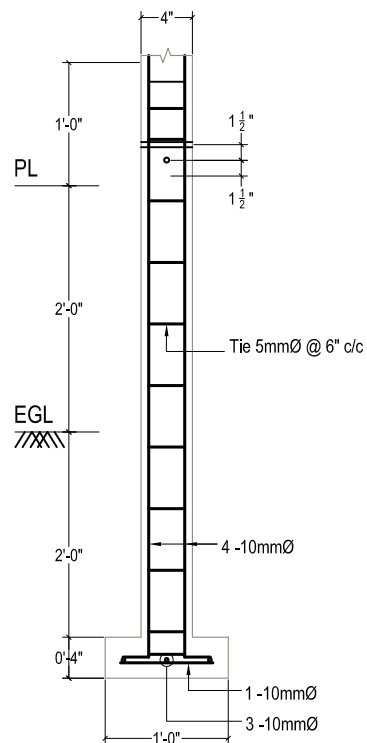
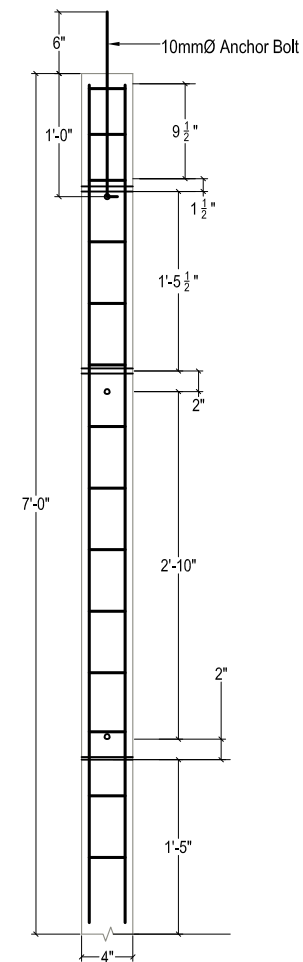
S - 04



DETAILS OF COLUMN(4"x4")



DETAILS OF FOOTING

DETAILS OF FOOTING  
AND  
COLUMN LOWER PARTDETAILS COLUMN  
UPPER PART

## NOTE :

- Concrete - 1 : 2 : 4  
 Aggregate - Brick Chips  
 - Sylhet Sand  
 Reinforcement - 60 Grade  
 Clear Cover - 3/4"

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: SHYMNAGAR, MUNSHIGONJ

TYPE DP-2 : Golpata Roof with Tati Wall

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRATERre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain  
 2. Prof. Dr. Mohammad Shariful Islam

CRATERre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

Md. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

DETAIL

July 2015

SHEET NO:

S - 05

MEMBER SCHEDULE				
SL.	ITEMS NAME	DIMENSIONS	MATERIALS NAME	REMARKS
1.	Purlin	1.5"x2"	Bamboo	
2.	Rafter	2.5"x2"	Timber	2"~2.5"Ø Bamboo Rafter in alternate row
3.	Tie Beam	2.5"x3.5"	Timber	3' Ø Bamboo alternative
4.	Window	2'-6"x3'-6"	Timber	Position may be Changed
5.	Door	3'-0"x6'-0"	Timber	Position may be Changed
6.	Golpata (Roof)		Golpata	
8.	Top tie	2"x1.5"	Timber	2" Ø Bamboo in alternate row
9.	Main Post	3" dia	Bamboo	
10.	Fence Supporting Post	2" dia	Bamboo	
11.	Corner Rafter	3"x2"	Timber	
12.	Corner Post	4"x4"x11'-0"	RCC (4-10 mm Steel)	Ratio=1:2:4
14.	Tati wall	10"x3"	Tati wall	Depth of wall variable

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: SHYMNAGAR, MUNSHIGONJ

TYPE DP-2 : Golpata Roof with Tati Wall

CONSULTANTS

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BANGLADESHENSAG-CRATERRE  
Grenoble , France

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CRAATERRE

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Caritas, Bangladesh

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MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXENBOURG

DRAWING TITLE:

MEMBER SCHEDULE

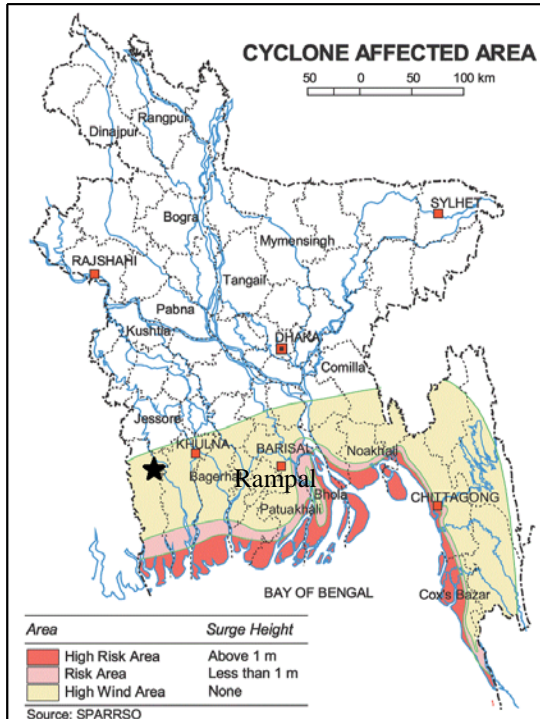
July 2015

SHEET NO:

S - 06

## DIVISION: KHULNA

### 6. DESIGN OF LCH IN RAMPAL: TYPE – DP 3



#### General Information:

##### Location:

District: Bagerhat

Upazila: Rampal

Union: Bashtoli

Mouza/ Village:

##### Climatic Feature: Saline

Avg. Maximum Temperature: 24 °C

Avg. Minimum temperature: 12°C

Annual Rainfall: 1947 mm

Average Relative Humidity: 76%

##### Geotechnical Feature:

Topography: Plain land near river bank

MSL: 3 m

Soil Characteristics: Silt

##### Disaster:

Tidal surge, Cyclone and tidal surge, River Flood, Strong Wind



Completed House

#### Design Considerations:

Available Building Materials: Mud, Bamboo, RC post, CGI sheets, Tiles, *Golpata*, Wood etc

Foundation: Bamboo posts/ *katla* embedded in soil (1-2 ft)

Post: RC posts at the corners of outer periphery + Treated bamboo on *katla*

Fence/Wall: Bamboo mat (2 parts)

Openings: 1 main door + 1 inside door to connect rooms

Ceiling: Ceiling is considered to protect heat and cold

Joints: Nails, notches, GI wire

Treatment (bamboo & wood): Water treatment & partial chemical treatment Cost: Tk. 85,000

Roof Type: Four pitched & veranda

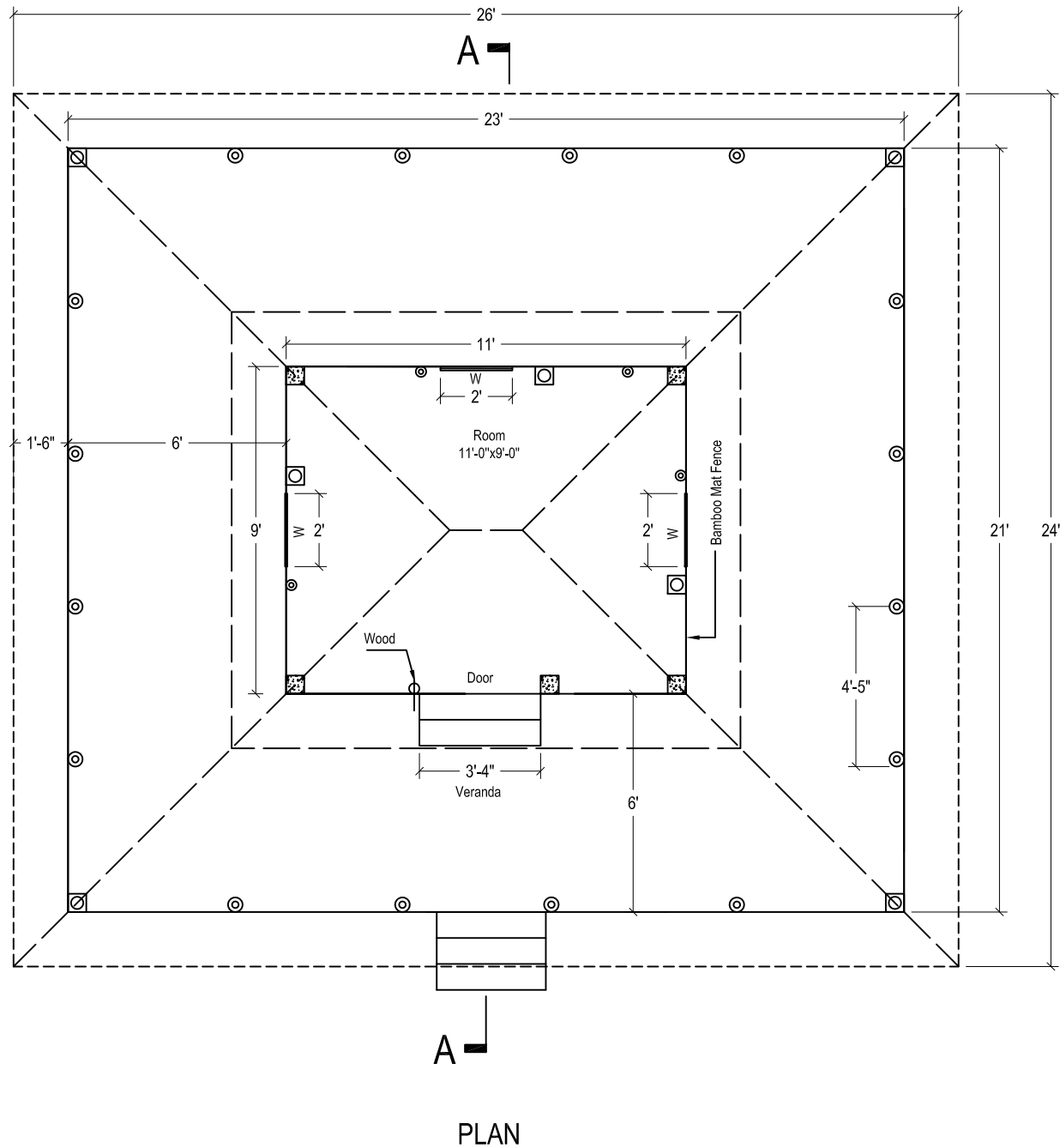
roof is disconnected from main roof

Roof cover: CGI sheet (main) & *Golpata* (veranda)






Plinth: Mud (two/three steps)

Roof structure: Wooden/ bamboo truss

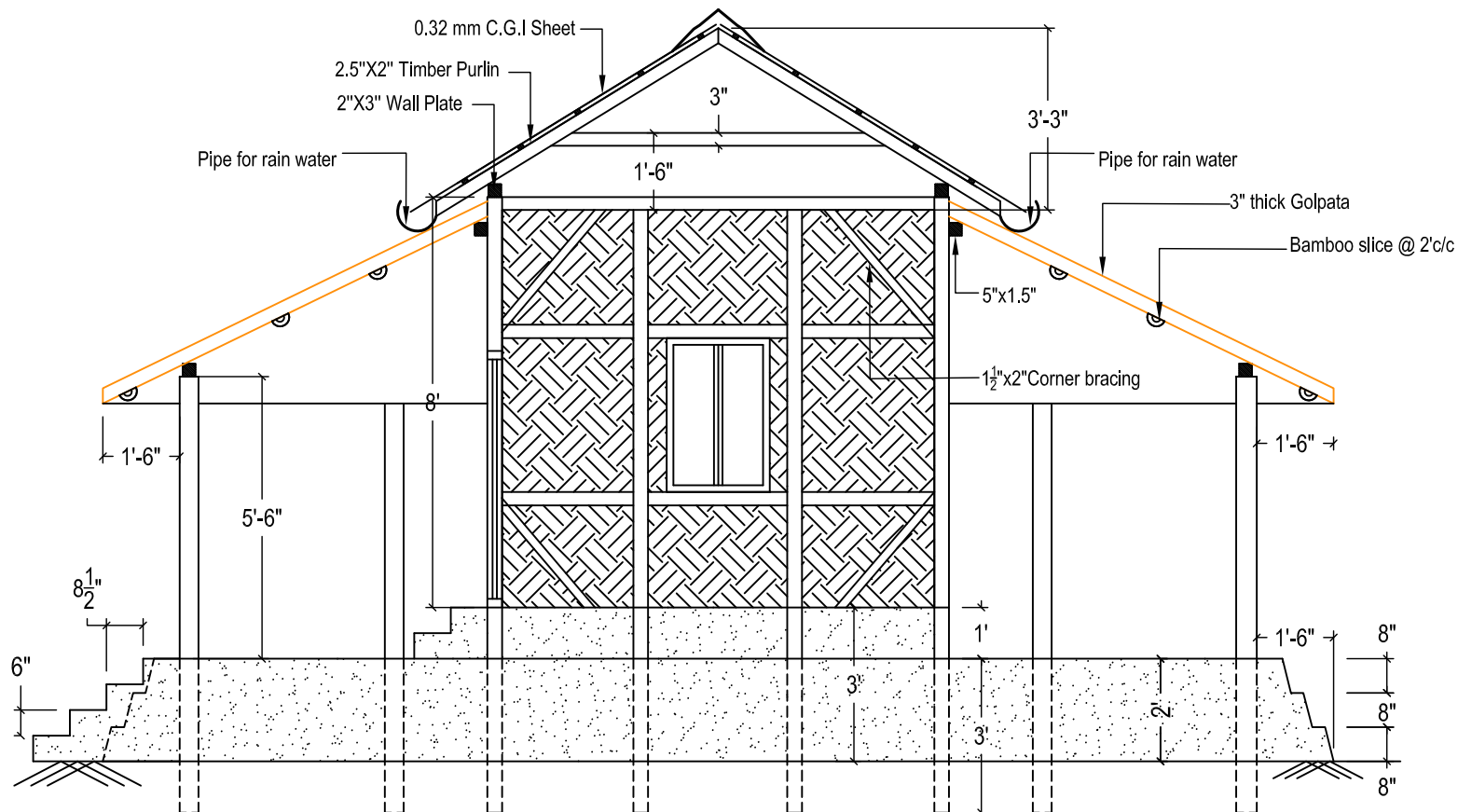
Bracing: Corner bracing



- 5"x5" - R C Post
- 5"x5" - RC *Katla* with 3"Ø Bamboo
- 3" Bamboo post
- 2" Bamboo post

PROJECT NAME :	
CONSTRUCTION OF PILOT LOW COST HOUSES (LCH)	
LOCATION: RAMPAL, BAGERHAT	
TYPE: DP-3	
CONSULTANTS	
 <p>DEPARTMENT OF CIVIL ENGINEERING, BRTC, BUET, DHAKA BANGLADESH</p>	 <p>ENSAG-CRAtterre Grenoble , France</p>
DESIGN BY:	
<u>BUET</u> 1. Prof. Dr. Tahsin Reza Hossain 2. Prof. Dr. Mohammad Shariful Islam  <u>CRAtterre</u> 3. Engr. Olivier Moles  <u>Caritas, Bangladesh</u> 1. Mr. Ratan Kumar Podder	
DRAWN BY :	
Md. ABU SAYED RASHED	
CLIENT	FUNDING AGENCIES
 <p>CARITAS BANGLADESH</p>	 <p>CARITAS FRANCE</p>  <p>CARITAS LUXEMBOURG</p>
DRAWING TITLE:	
PLAN	
July, 2015	SHEET NO: S - 01





SECTION : A - A

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: RAMPAL, BAGERHAT

TYPE: DP-3

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

Md. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

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BANGLADESH

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CARITAS  
LUXEMBOURG

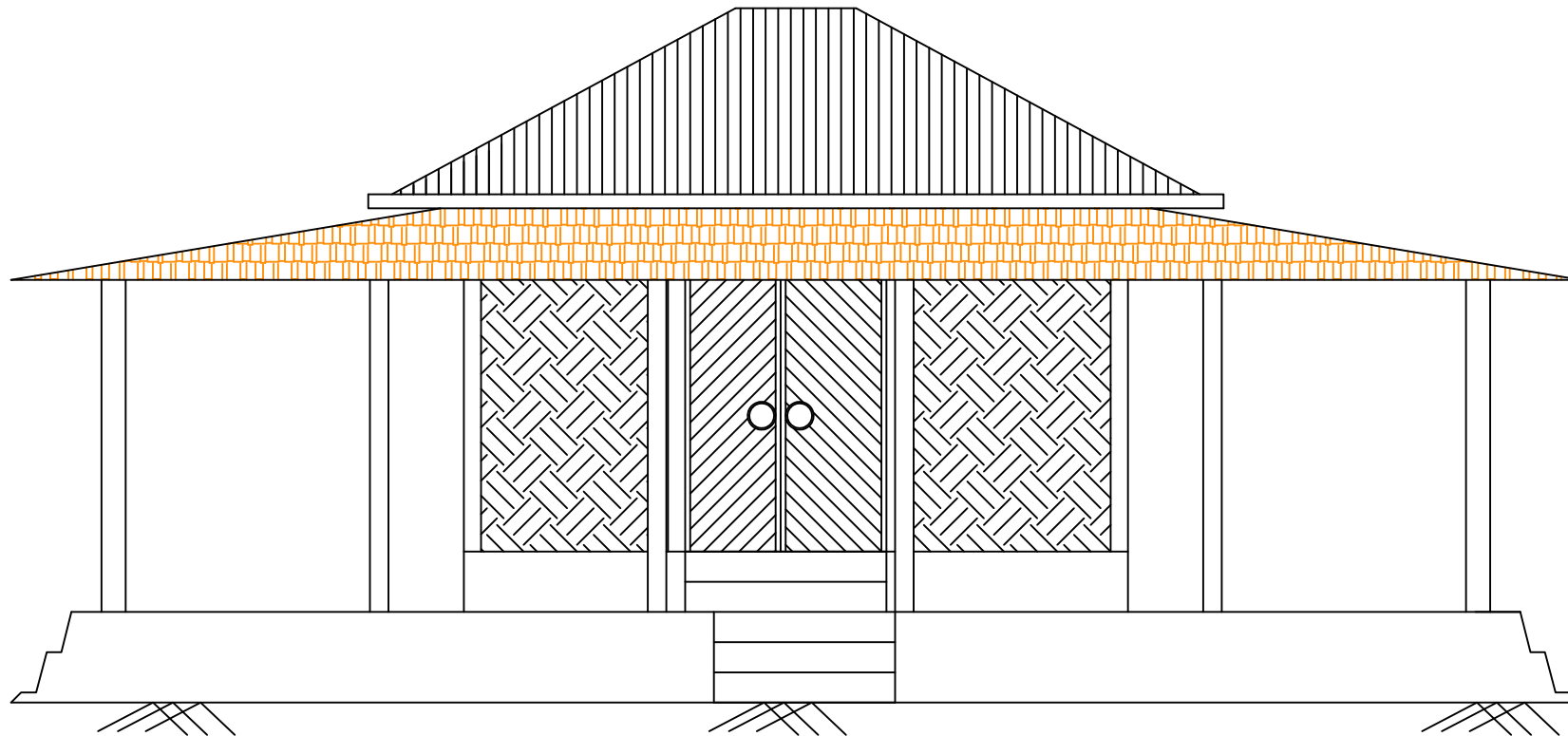
DRAWING TITLE:

SECTION A - A

July, 2015

SHEET NO:

S - 02



FRONT ELEVATION

**PROJECT NAME :****CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)**

LOCATION: RAMPAL, BAGERRHAT

TYPE: DP-3

**CONSULTANTS**DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAtterre  
Grenoble , France**DESIGN BY:****BUET**

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

**CRAtterre**

3. Engr. Olivier Moles

**Caritas, Bangladesh**

1. Mr. Ratan Kumar Podder

**DRAWN BY :**

Md. ABU SAYED RASHED

**CLIENT**CARITAS  
BANGLADESH**FUNDING AGENCIES**

CARITAS FRANCE

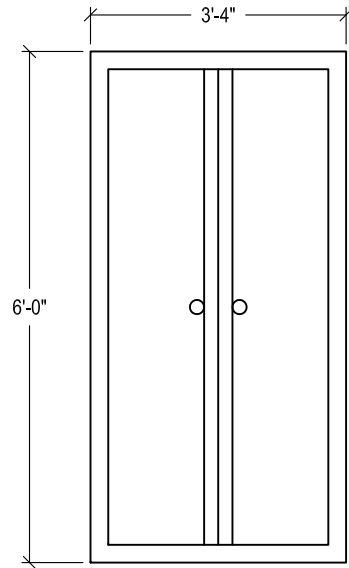
CARITAS  
LUXEMBOURG**DRAWING TITLE:**

FRONT ELEVATION

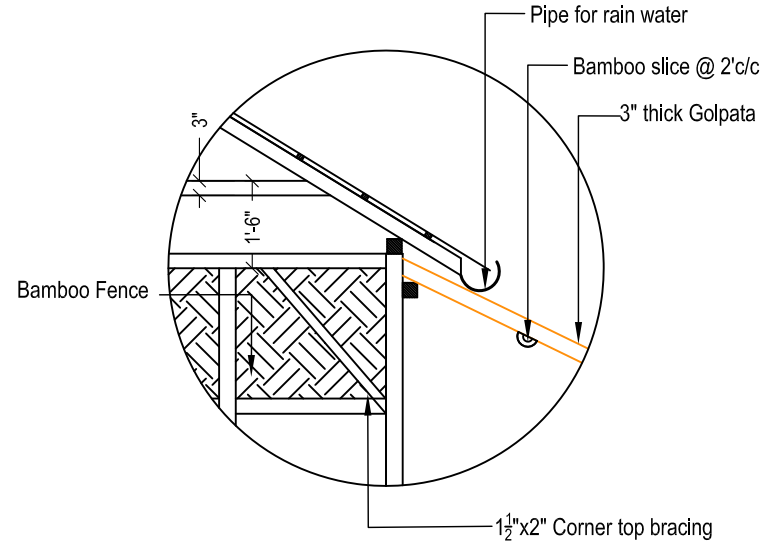
July, 2015

**SHEET NO:**

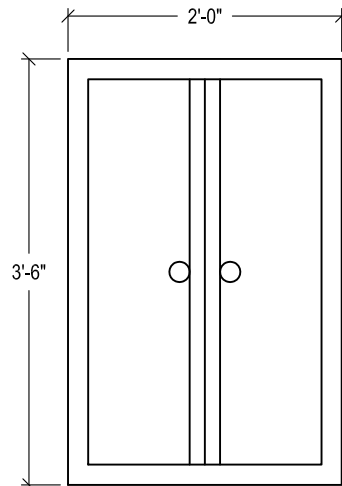
S - 03



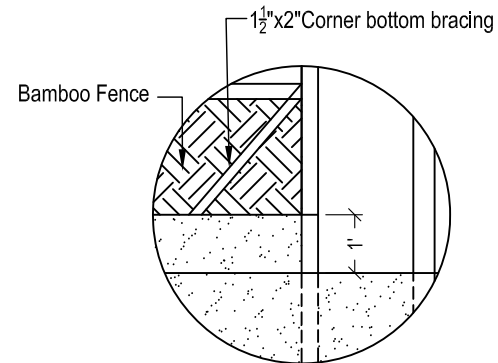
Detail 01: Door



Detail 03: Corner Top



Detail 02: Window



Detail 04: Corner Bottom

**PROJECT NAME :****CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)**

LOCATION: RAMPAL, BAGERHAT

TYPE: DP-3

**CONSULTANTS**DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France**DESIGN BY:**BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

**DRAWN BY :**

Md. ABU SAYED RASHED

**CLIENT****FUNDING AGENCIES**CARITAS  
BANGLADESH

CARITAS FRANCE

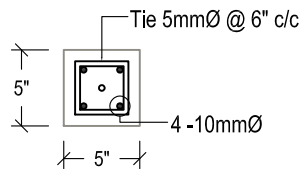
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LUXEMBOURG**DRAWING TITLE:**

DETAIL

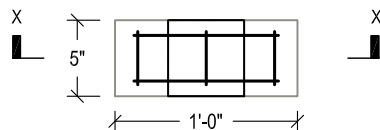
July, 2015

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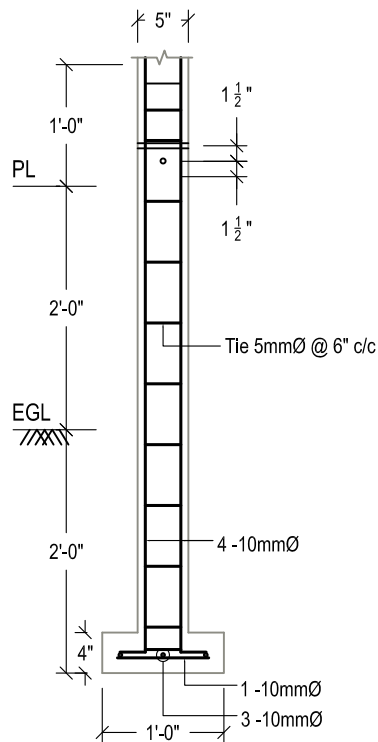
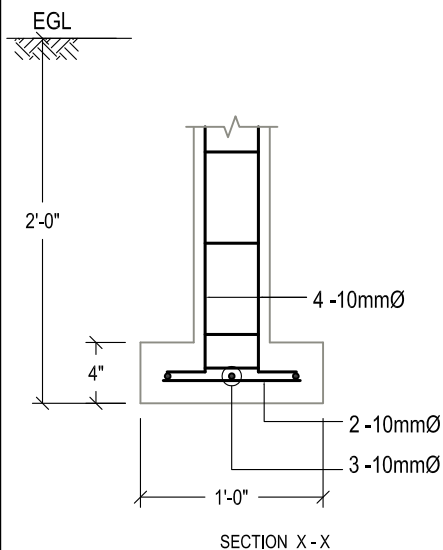
S - 04



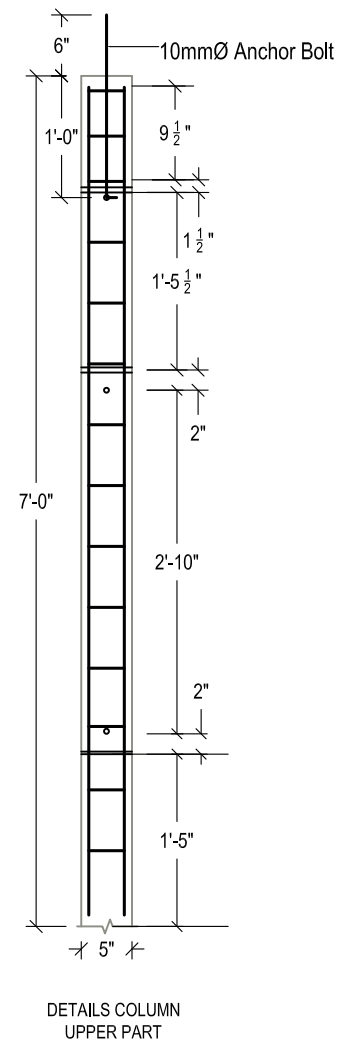
DETAILS OF COLUMN(5"X5")



DETAILS OF FOOTING



DETAILS OF FOOTING  
AND  
COLUMN LOWER PART



NOTE :

Concrete - 1 : 2 : 4

Aggregate - Brick Chips

- Sylhet Sand

Reinforcement - 60 Grade

Clear Cover - 3/4"

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: RAMPAL, BAGERHAT

TYPE: DP-3

CONSULTANTS



DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESH



ENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain  
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

Md. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES



CARITAS  
BANGLADESH



CARITAS FRANCE



CARITAS  
LUXEMBOURG

DRAWING TITLE:

DETAIL

July, 2015

SHEET NO:

S - 05

MEMBER SCHEDULE				
SL.	ITEMS NAME	DIMENSIONS	MATERIALS NAME	REMARKS
1.	Roof (main house)	0.32 mm	CGI Sheet	
2.	Roof (veranda)	3" thick	<i>Gol Pata</i>	
3.	Purlin (main house)	2.5"x1"	Timber	@ 2'-6" c/c
4.	Purlin (veranda)		Bamboo Slice	@ 2' c/c
5.	Rafter	2"~2.5" dia	Bamboo	@ 2'-6" to 3'-6" c/c
6.	Corner Rafter	3"x2.5"	Timber	
7.	Tie Beam	3" dia	Timber	@ 4'-0" c/c
8.	Wall Plate (main house)	3"x2"	Timber	
9.	Wall Plate (veranda)	5"x1.5"	Timber	
11.	Fence		Bamboo mat	
12.	Main Post	3" dia	Bamboo	
13.	Fence Supporting Post	2" dia	Bamboo	
14.	Corner Post	5"x5"x11'-0"	RC	4-10 mm Ø 1:2:4 Concrete
15.	Door	3'-0"x6'-0"	Timber	Position may be Changed
16.	Window	2'-3"x3'-6"	Timber	Position may be Changed
17.	Corner Bracing	2"x1.5"		

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: RAMPAL, BAGERHAT

TYPE: DP-3

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

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2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXENBOURG

DRAWING TITLE:

MEMBER SCHEDULE

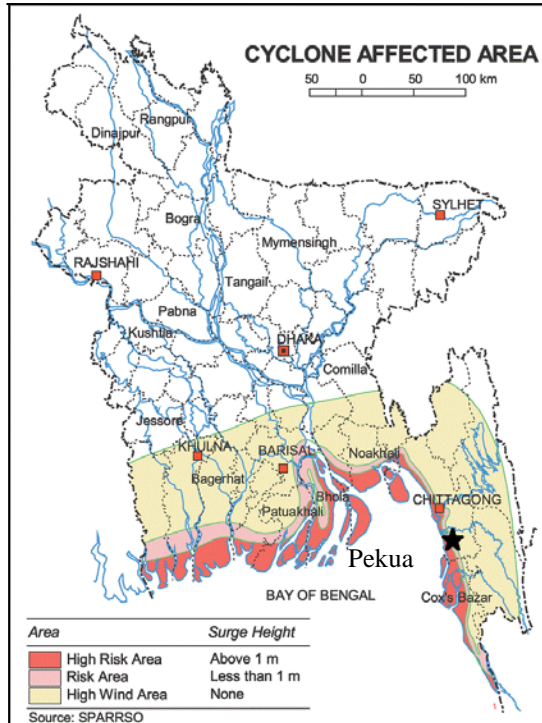
July, 2015

SHEET NO:

S - 06

## DIVISION: CHITTAGONG

### 7. DESIGN OF LCH IN ANOWARA: TYPE – DP 2



#### SITE TOPOGRAPHY



#### General Information:

##### Location:

District: Chittagong  
Upazila: Anowara  
Union: Juidandi  
Mouza/ Village: Uttarpara

##### Climatic Feature: Saline

Avg. Maximum Temperature: 32.5 °C  
Avg. Minimum temperature: 13.5°C  
Annual Rainfall: 2687 mm  
Average Relative Humidity: 75%

##### Geotechnical Feature:

Topography: Flat land  
MSL: 3 m  
Soil Characteristics: Medium Plastic Clay

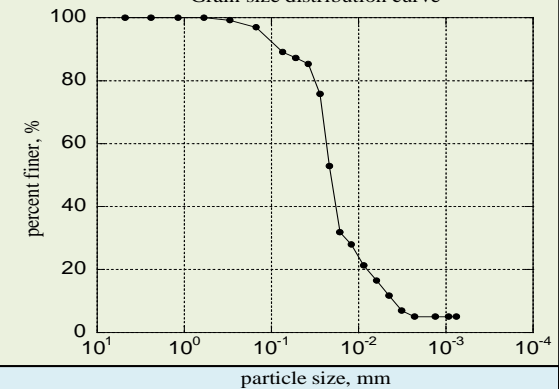
##### Disaster:

Cyclone, and Tidal surge, Flood, Northwester



#### Completed House

##### Grain size distribution curve



#### Design Considerations:

Available Building Materials: Mud, Bamboo, RC posts, GI wire, CGI sheets, Straw, Wood etc

Foundation: RC/Wooden/Bamboo posts embedded in soil (1-2 ft)

Plinth: Mud with steps

Post: Wooden, bamboo post or RC posts

Fence/Wall: Bamboo fence over CGI sheet

Openings: 1 main door + 1 inside door to connect rooms

Ceiling: Ceiling is considered to protect heat and cold

Treatment (bamboo & wood): Water treatment & partial chemical treatment

Roof Type: Four pitched

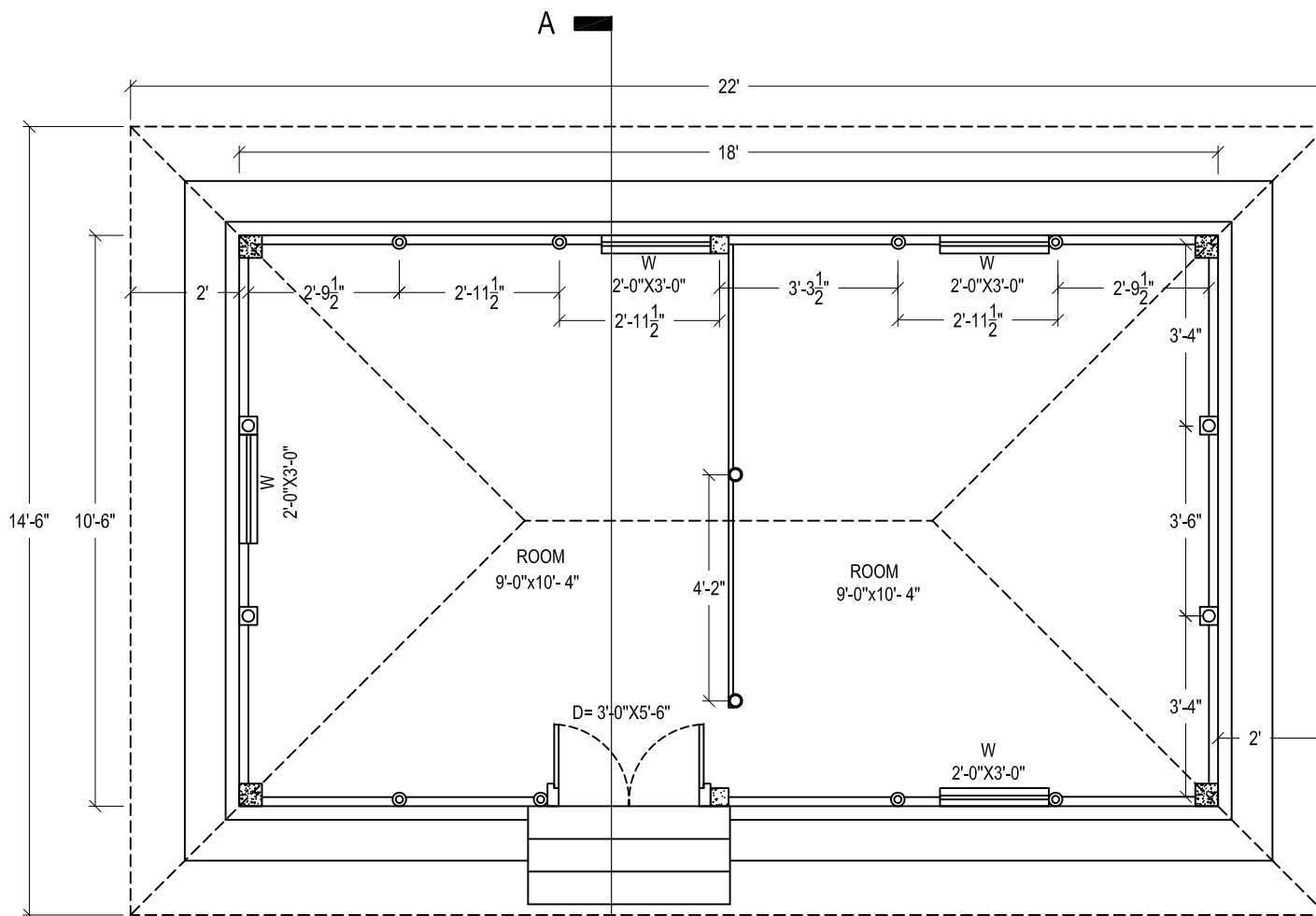
Roof cover: CGI sheet

Roof structure: Wooden truss

Bracing: Corner bracing

Cost: Tk. 75,000

Joints: Nails, notches, GI wire,

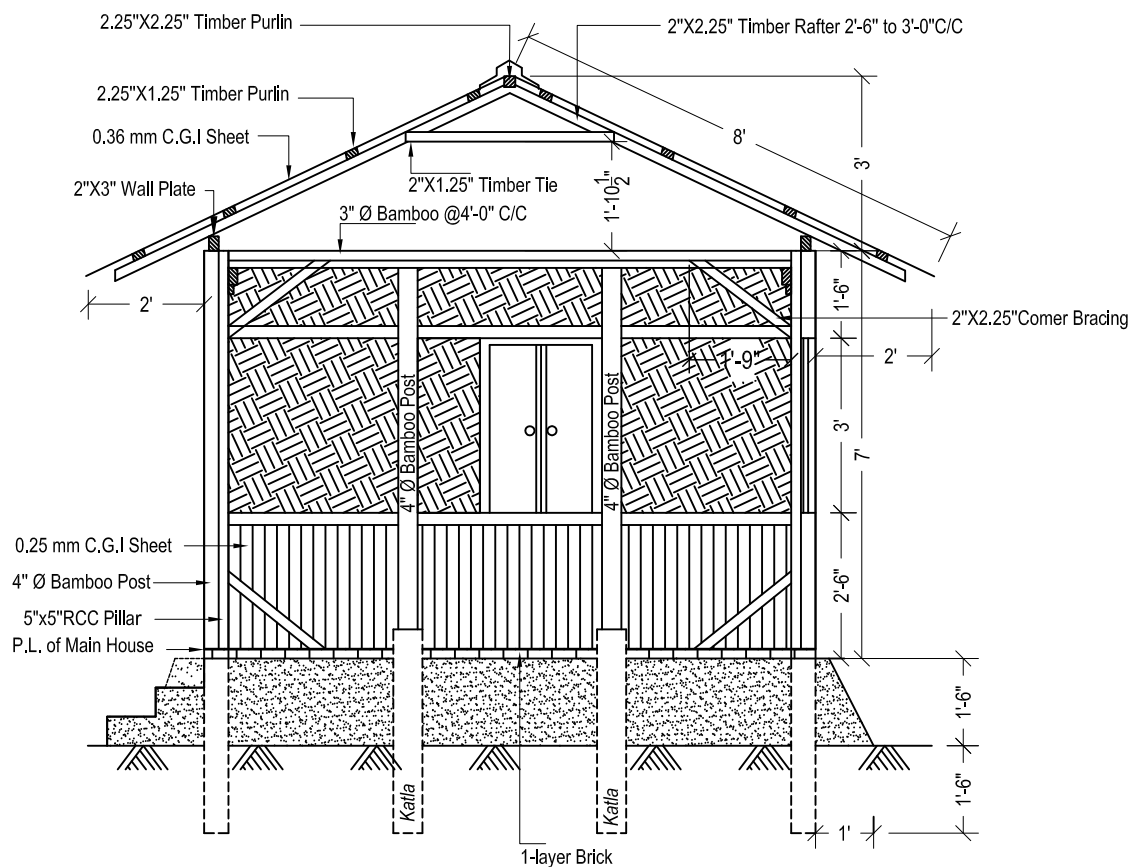


PLAN

- 5"x5" RC Post
- 5"x5" RC Katla with Bamboo Post
- Bamboo Post 2.5'~3"

PROJECT NAME :	
CONSTRUCTION OF PILOT LOW COST HOUSES (LCH)	
LOCATION: ANOWARA, CHITTAGONG	
TYPE: DP-2	
CONSULTANTS	
 DEPARTMENT OF CIVIL ENGINEERING, BRTC, BUET, DHAKA BANGLADESH	 ENSAG-CRATERRE Grenoble, France
DESIGN BY:	
BUET 1. Prof. Dr. Tahsin Reza Hossain 2. Prof. Dr. Mohammad Shariful Islam	
CRATERRE 3. Engr. Olivier Moles	
Caritas, Bangladesh 1. Mr. Ratan Kumar Podder	
DRAWN BY :	
Md. ABU SAYED RASHED	
CLIENT	FUNDING AGENCIES
 CARITAS BANGLADESH	 Caritas France Secours Catholique CARITAS FRANCE   CARITAS LUXEMBOURG
DRAWING TITLE:	
PLAN	
July, 2015	SHEET NO: S - 01





SECTION A - A

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: ANOWARA, CHITTAGONG

TYPE: DP-2

CONSULTANTS

DEPARTMENT OF  
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BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAtterre  
Grenoble , France

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BUET

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CRAtterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

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FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

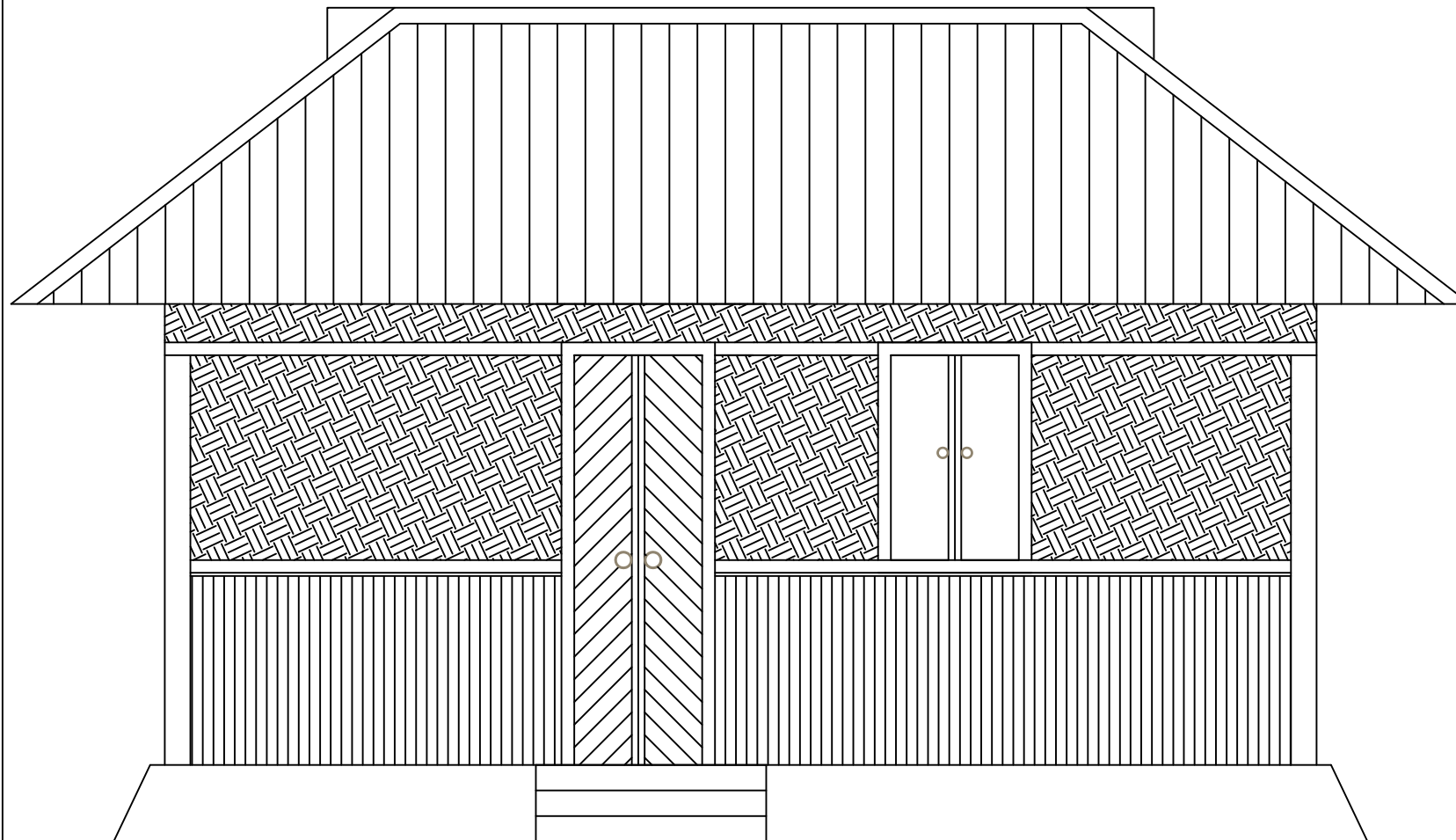
DRAWING TITLE:

SECTION - A - A

July, 2015

SHEET NO:

S - 02



FRONT ELEVATION

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: ANOWARA, CHITTAGONG

TYPE: DP-2

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

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CRAterre

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CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

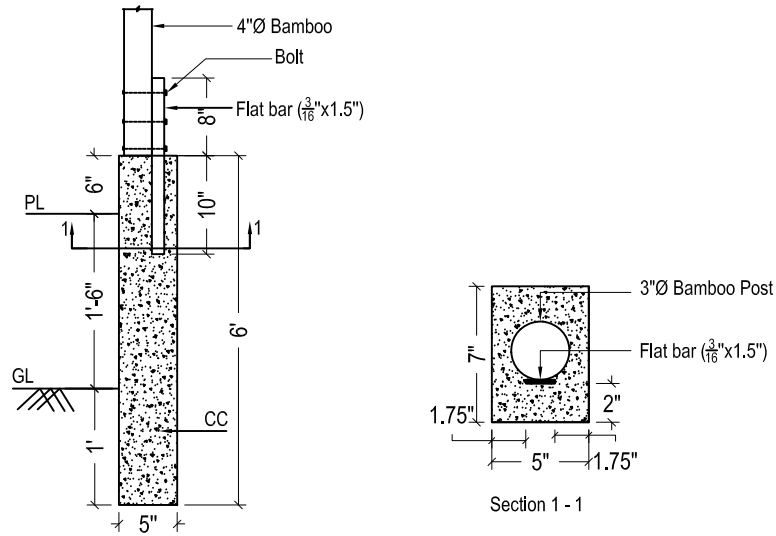
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FRONT ELEVATION

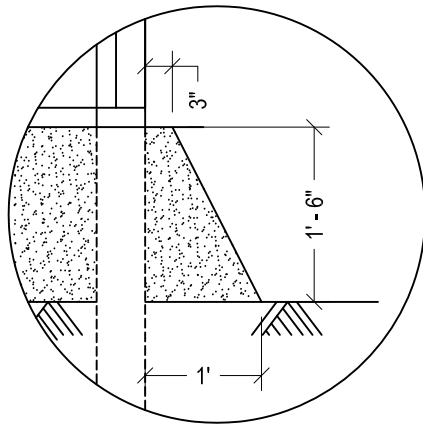
July, 2015

SHEET NO:

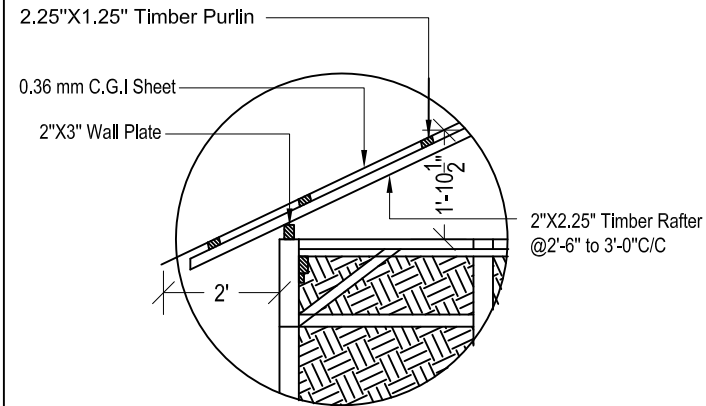
S - 03



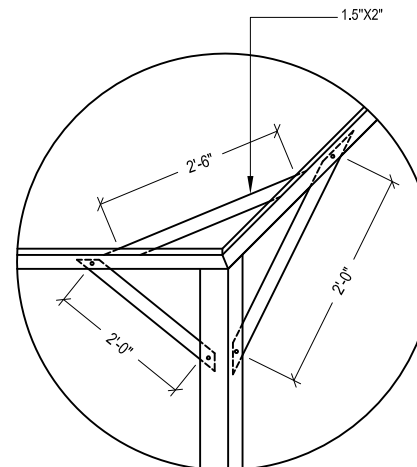
Detail 01: Katla



Detail 02: Plinth



Detail 03: Corner bracing and roof arrangement



Detail 04: Corner Bracing

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: ANOWARA, CHITTAGONG

TYPE: DP-2

CONSULTANTS



DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESH



ENSAG-CRATERRE  
Grenoble, France

DESIGN BY:

BUET

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2. Prof. Dr. Mohammad Shariful Islam

CRATERRE

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

Md. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES



CARITAS  
BANGLADESH



CARITAS FRANCE



CARITAS  
LUXEMBOURG

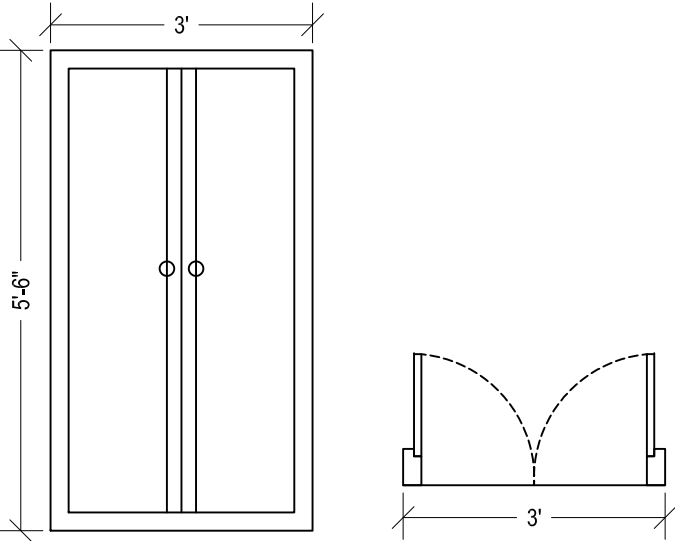
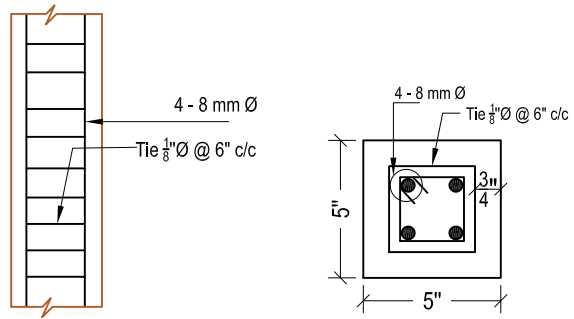


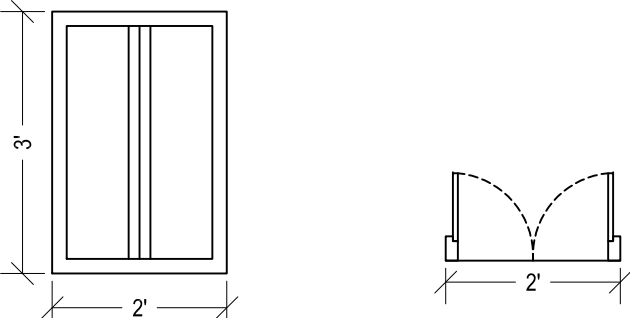
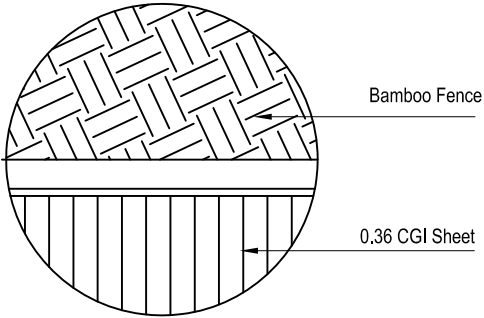



DRAWING TITLE:

DETAILS

July, 2015

SHEET NO:

S - 04

		<p>PROJECT NAME :</p> <p>CONSTRUCTION OF PILOT LOW COST HOUSES (LCH)</p> <p>LOCATION: ANOWARA, CHITTAGONG</p> <p>TYPE: DP-2</p> <p>CONSULTANTS</p> <div>  <p>DEPARTMENT OF CIVIL ENGINEERING, BRTC, BUET, DHAKA BANGLADESH</p> </div> <div>  <p>ENSAG-CRATERRE Grenoble , France</p> </div> <p>DESIGN BY:</p> <p>BUET</p> <p>1. Prof. Dr. Tahsin Reza Hossain 2. Prof. Dr. Mohammad Shariful Islam</p> <p>CRATERRE</p> <p>3. Engr. Olivier Moles</p> <p>Caritas, Bangladesh</p> <p>1. Mr. Ratan Kumar Podder</p>
		<p>DRAWN BY :</p> <p>Md. ABU SAYED RASHED</p> <p>CLIENT</p> <p>FUNDING AGENCIES</p> <div>  <p>CARITAS BANGLADESH</p> </div> <div>  <p>Caritas France Secours Catholique CARITAS FRANCE</p> </div> <div>  <p>caritas LUXEMBOURG</p> </div> <p>DRAWING TITLE:</p> <p>DETAILS</p>
<p>Detail 06: Window</p>	<p>Detail 08: CGI Sheet &amp; Bamboo Fence Joint</p>	<p>July, 2015</p> <p>SHEET NO:</p> <p>S - 05</p>

MEMBER SCHEDULE				
SL.	ITEMS NAME	DIMENSIONS	MATERIALS NAME	REMARKS
1.	Purlin	1.5"x2"	Timber	
2.	Rafter	2.5"x2"	Timber	2"~2.5"Ø Bamboo Rafter in alternate row
3.	Tie Beam	2.5"x3.5"	Timber	3' Ø Bamboo alternative
4.	Window	2'-6"x3'-6"	Timber	Position may be Changed
5.	Door	3'-0"x6'-0"	Timber	Position may be Changed
6.	CGI Sheet (Roof)	0.32 mm	CGI Sheet	
8.	Top tie	2"x1.5"	Timber	2" Ø Bamboo in alternate row
9.	CGI Sheet Fence	0.20 mm	CGI Sheet	
10.	Main Post	3" dia	Bamboo	
11.	Fence Supporting Post	2" dia	Bamboo	
12.	Corner Rafter	3"x2"	Timber	
14.	Corner Post	4"x4"x11'-0"	RCC (4-10 mm Steel)	Ratio=1:2:4
15.	Angle Bar	1.5"x0.25"x1'-6"	Steel	10" in concrete, 8" open to joint bolt
16.	Brick guide wall	10"x3"	Brick Masonary	Depth of wall variable

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: ANOWARA, CHITTAGONG

TYPE: DP-2

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain  
2. Prof. Dr. Mohammad Shariful Islam

CRAAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXENBOURG

DRAWING TITLE:

MEMBER SCHEDULE

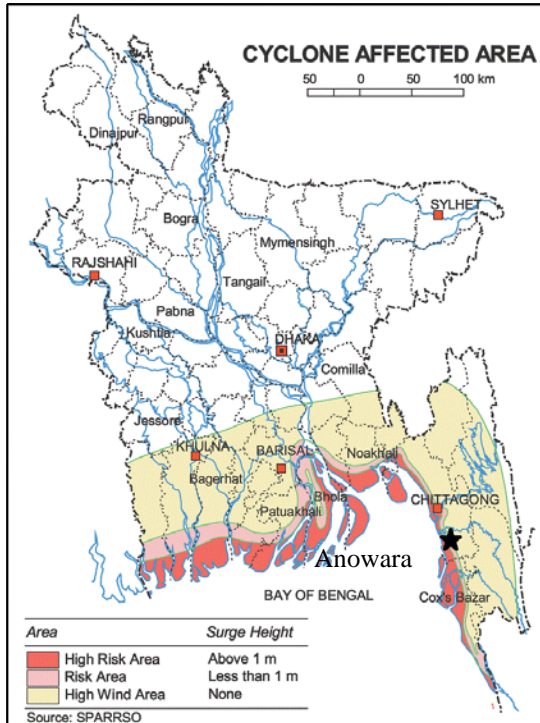
July, 2015

SHEET NO:

S - 06

## DIVISION: CHITTAGONG

### 8. DESIGN OF LCH IN PEKUA: TYPE – DP 3



#### SITE TOPOGRAPHY



#### General Information:

##### Location:

District: Cox's Bazar  
Upazila: Pekua  
Union: Ujantia  
Mouza/ Village: Gosalpara

##### Climatic Feature: Saline

Avg. Maximum Temperature: 32.5 °C  
Avg. Minimum temperature: 13.5°C  
Annual Rainfall: 2687 mm  
Average Relative Humidity: 76%

##### Geotechnical Feature:

Topography: Flat land  
MSL: 7 m  
Soil Characteristics: Medium Plastic Clay

##### Disaster:

Cyclone, Tidal surge, Flood, River Erosion, Northwester



**Completed House**

#### Design Considerations:

Available Building Materials: Mud, Bamboo, RC posts, GI wire, CGI sheets, Straw, Wood etc

Foundation: Wooden/ Bamboo posts embedded in soil (1-2 ft)

Plinth: Mud plinth

Post: Wooden, bamboo post or RC posts

Fence/Wall: CGI sheet

Openings: 1 main door + 1 inside door to connect rooms

Ceiling: Ceiling is considered to protect heat and cold

Treatment (bamboo & wood): Water treatment & partial chemical treatment

Roof Type: Four pitched

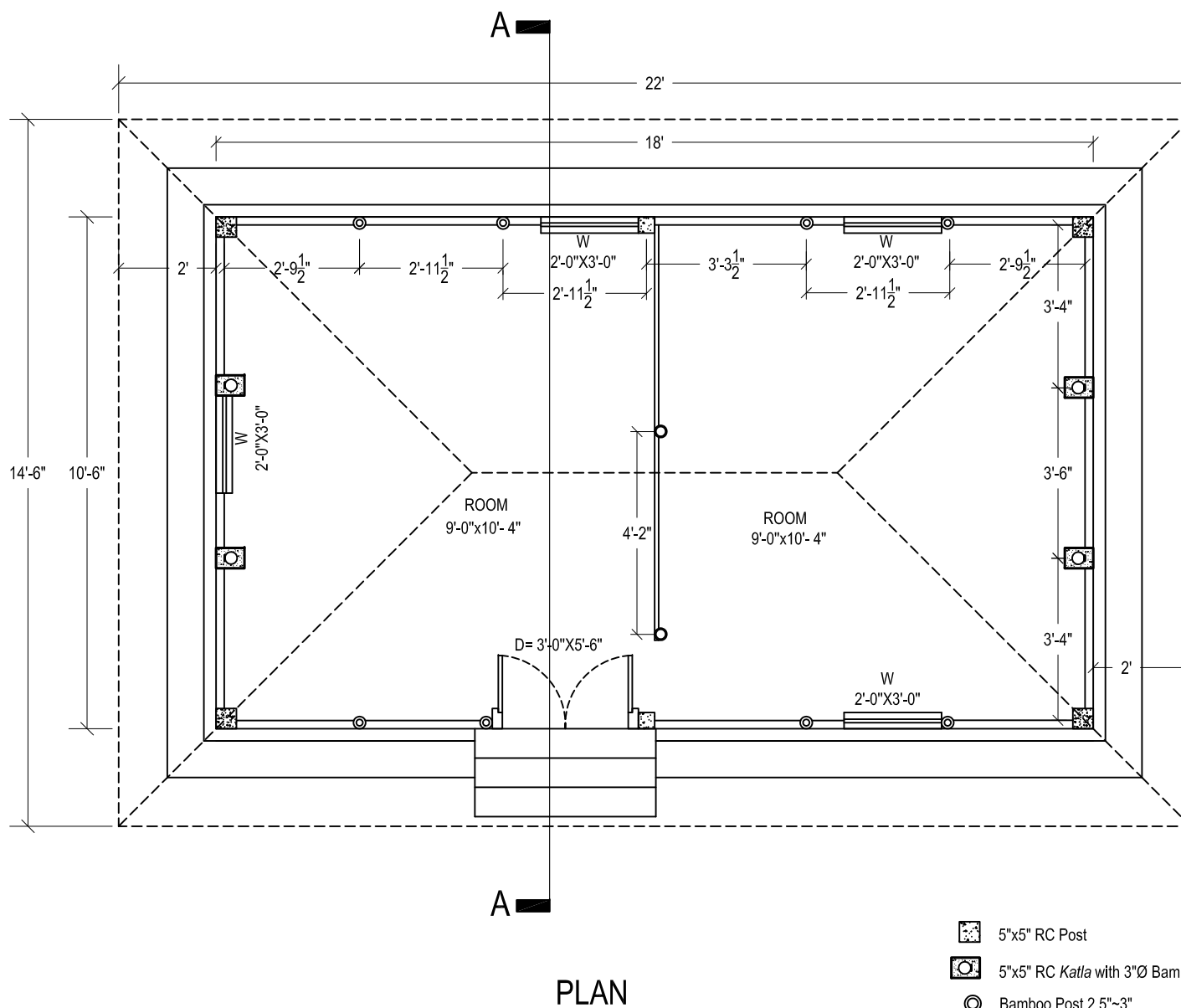
Roof cover: CGI sheet

Roof structure: Wooden truss

Bracing: Corner bracing

Cost: Tk. 75,000

Joints: Nails, notches, GI wire



PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: PEKUA, COX'S BAZAR

TYPE: DP-3

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

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CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

Md. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

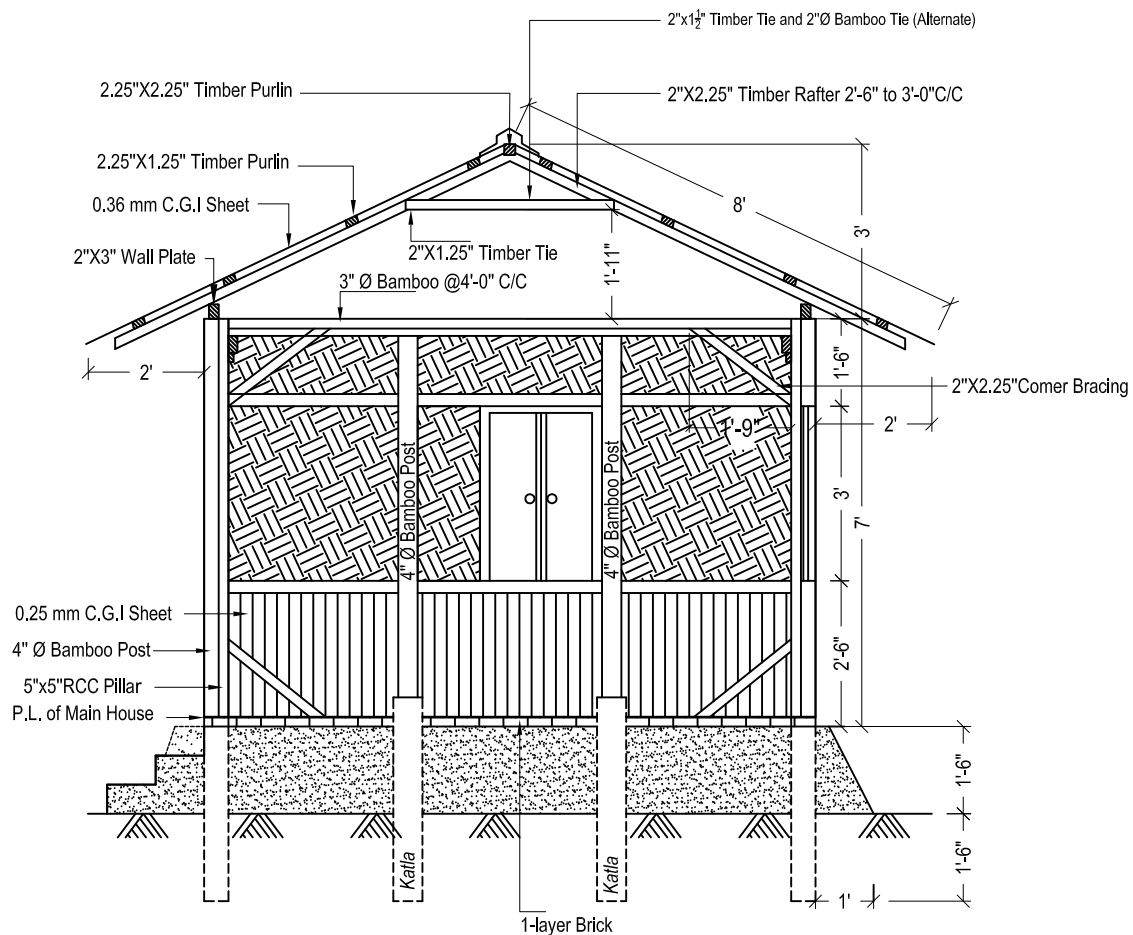
PLAN

July, 2015

SHEET NO:

S - 01





SECTION : A - A

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: PEKUA, COX'S BAZAR

TYPE: DP-3

CONSULTANTS

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BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
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CRAterre

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1. Mr. Ratan Kumar Podder

DRAWN BY :

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CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

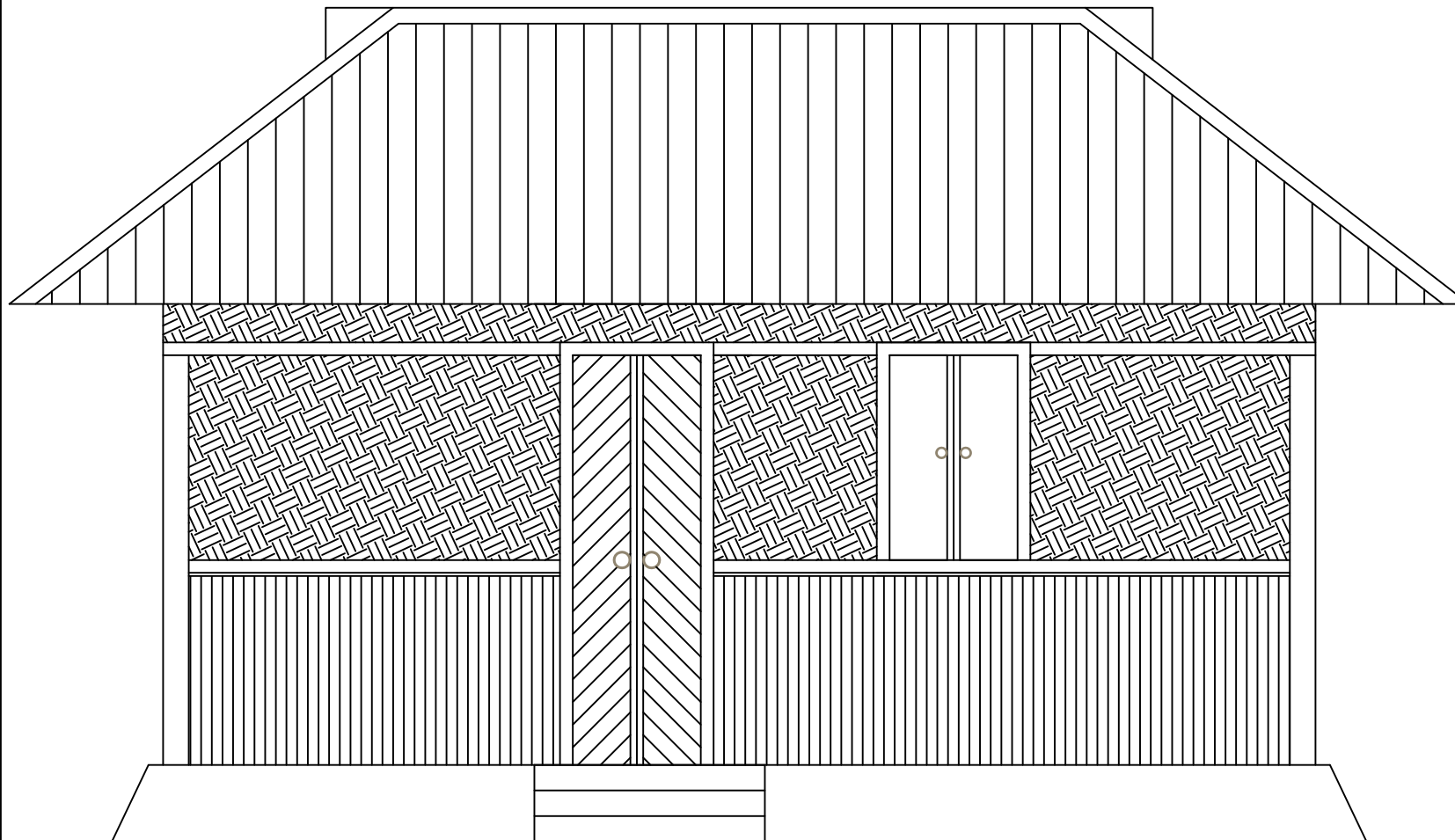
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SECTION - A - A

July, 2015

SHEET NO:

S - 02



FRONT ELEVATION

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: PEKUA, COX'S BAZAR

TYPE: DP-3

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

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CRAterre

3. Engr. Olivier Moles

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CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

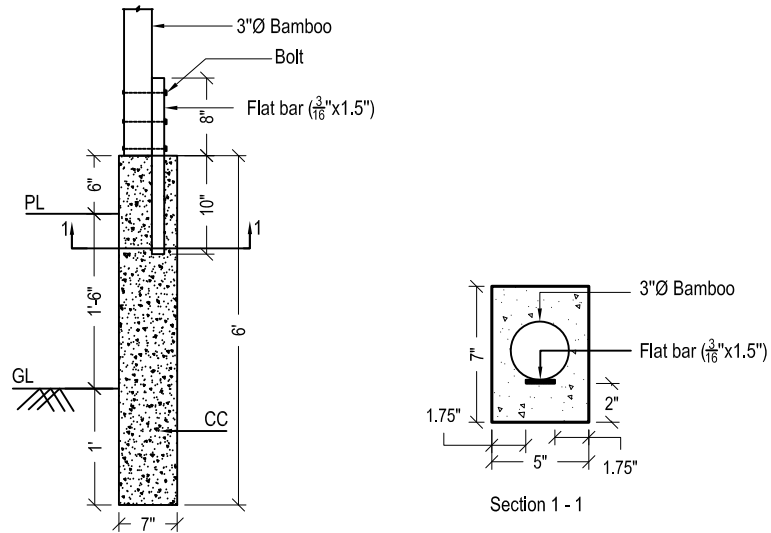
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FRONT ELEVATION

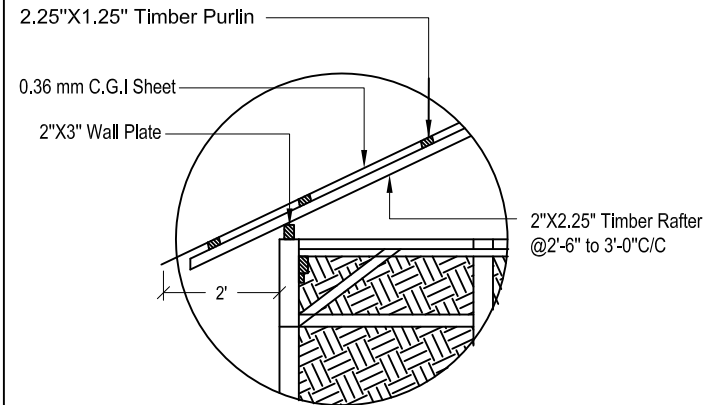
July, 2015

SHEET NO:

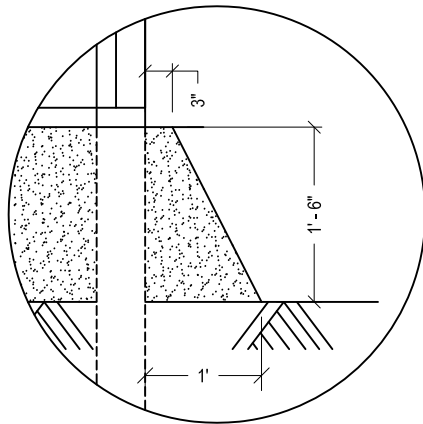
S - 03



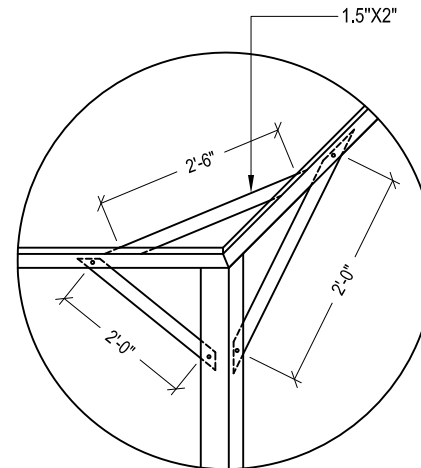
Detail 01: Katla



Detail 03: Corner bracing and roof arrangement



Detail 02: Plinth



Detail 04: Corner Bracing

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: PEKUA, COX'S BAZAR

TYPE: DP-3

CONSULTANTS



DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESH



ENSAG-CRATERRE  
Grenoble, France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRATERRE

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

Md. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES



CARITAS  
BANGLADESH



CARITAS FRANCE



CARITAS  
LUXEMBOURG

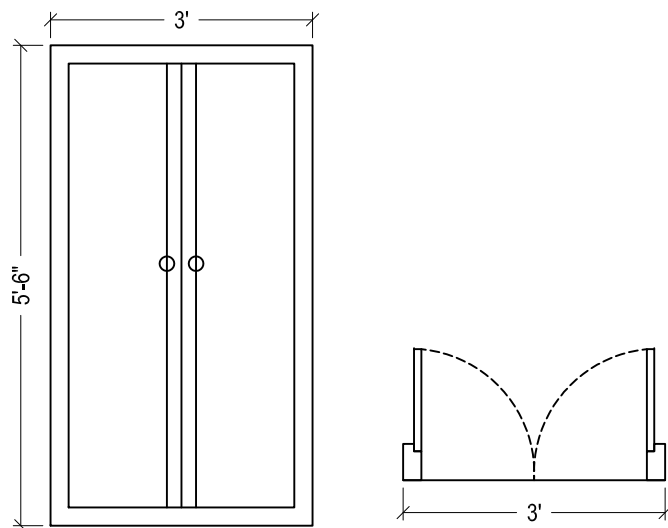
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DETAILS

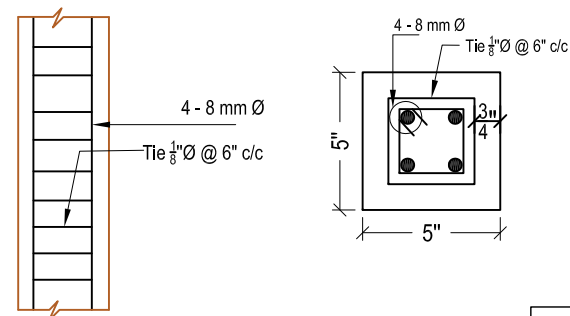
July, 2015

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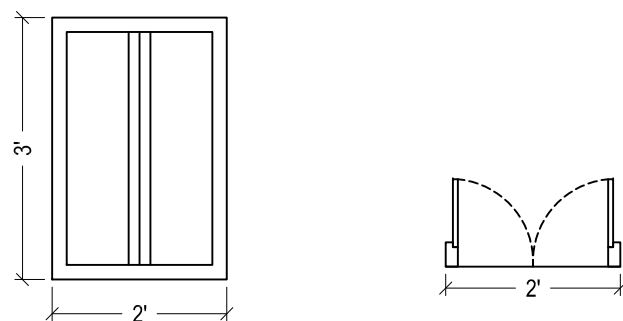
S - 04



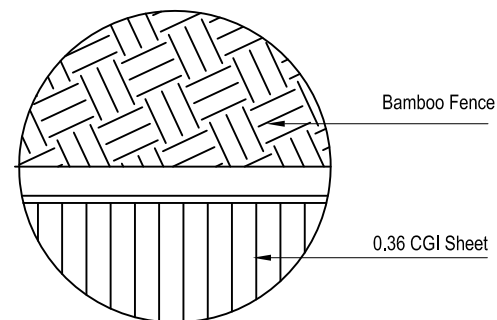
Detail 05: Door



Detail 07: RC Post(Long Section &amp; Cross Section)



Detail 06: Window



Detail 08: CGI Sheet &amp; Bamboo Fence Joint

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: PEKUA, COX'S BAZAR

TYPE: DP-3

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRaterre  
Grenoble , France

DESIGN BY :

BUET

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2. Prof. Dr. Mohammad Shariful Islam

CRATERRE

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

Md. ABU SAYED RASHED

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FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

DETAILS

July, 2015

SHEET NO:

S - 05

MEMBER SCHEDULE				
SL.	ITEMS NAME	DIMENSIONS	MATERIALS NAME	REMARKS
1.	Purlin	1.5"x2"	Timber	
2.	Rafter	2.5"x2"	Timber	2"~2.5"Ø Bamboo Rafter in alternate row
3.	Tie Beam	2.5"x3.5"	Timber	3' Ø Bamboo alternative
4.	Window	2'-0"x3'-0"	Timber	Position may be Changed
5.	Door	3'-0"x5'-6"	Timber	Position may be Changed
6.	CGI Sheet (Roof)	0.32 mm	CGI Sheet	
8.	Top tie	2"x1.5"	Timber	2" Ø Bamboo in alternate row
9.	CGI Sheet Fence	0.20 mm	CGI Sheet	
10.	Main Post	3" dia	Bamboo	
11.	Fence Supporting Post	2" dia	Bamboo	
12.	Corner Rafter	3"x2"	Timber	
14.	Corner Post	4"x4"x11'-0"	RCC (4-10 mm Steel)	Ratio=1:2:4
15.	Angle Bar	1.5"x0.25"x1'-6"	Steel	10" in concrete, 8" open to joint bolt
16.	Brick guide wall	10"x3"	Brick Masonary	Depth of wall variable

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: PEKUA, COX'S BAZAR

TYPE: DP-3

CONSULTANTS

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CRAAterre

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FUNDING AGENCIES

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CARITAS  
LUXENBOURG

DRAWING TITLE:

MEMBER SCHEDULE

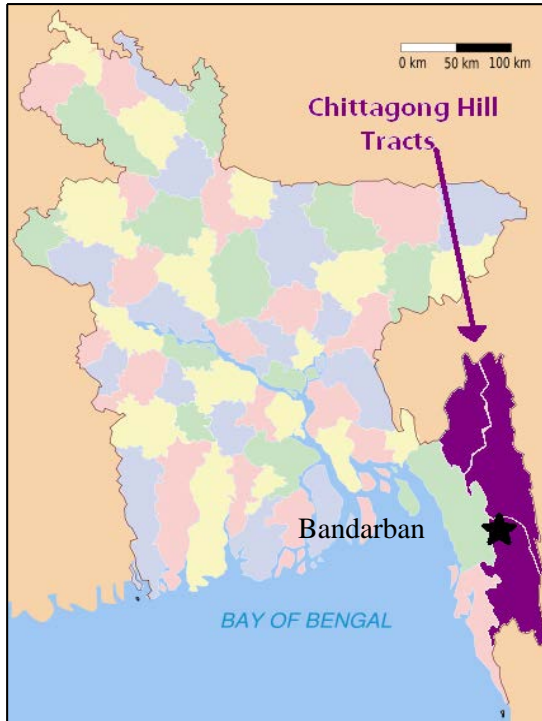
July, 2015

SHEET NO:

S - 06

## DIVISION: CHITTAGONG

### 9. DESIGN OF LCH IN BANDARBAN: TYPE – 1



#### SITE TOPOGRAPHY



#### General Information:

##### Location:

District: Bandarban  
Upazila: Bandarban Sadar  
Union: Sadar  
Mouza/ Village: Lemujhiri para

##### Climatic Feature:

Avg. Maximum Temperature: 35 °C  
Avg. Minimum temperature: 13°C  
Annual Rainfall: 3031 mm  
Average Relative Humidity: 76%

##### Geotechnical Feature:

Topography: hilly  
MSL: 21 m  
Soil Characteristics: Sandy soil over stone soil, Coarse sand (in valley) and Silt (in hill)

##### Disaster:

Flash flood, cyclone, tidal surge, Landslides due to heavy rain, earthquake, fire, northwester/tornado



Completed House

#### Design Considerations:

Available Building Materials: Mud, Bamboo, Brick, GI wire, CGI sheets, Straw, Wood etc

Foundation: Wooden/ Bamboo posts embedded in soil (1-2 ft)      Roof Type: Four pitched

Plinth: Machan (raised platform) with wooden posts directly in the ground and rest on *katla*

Post: Wooden pole with *katla*

Roof cover: CGI sheet

Fence/Wall: Bamboo mat (2 parts)

Roof structure: Wooden truss

Openings: 1 main door + 1 inside door to connect rooms

Bracing: Corner bracing

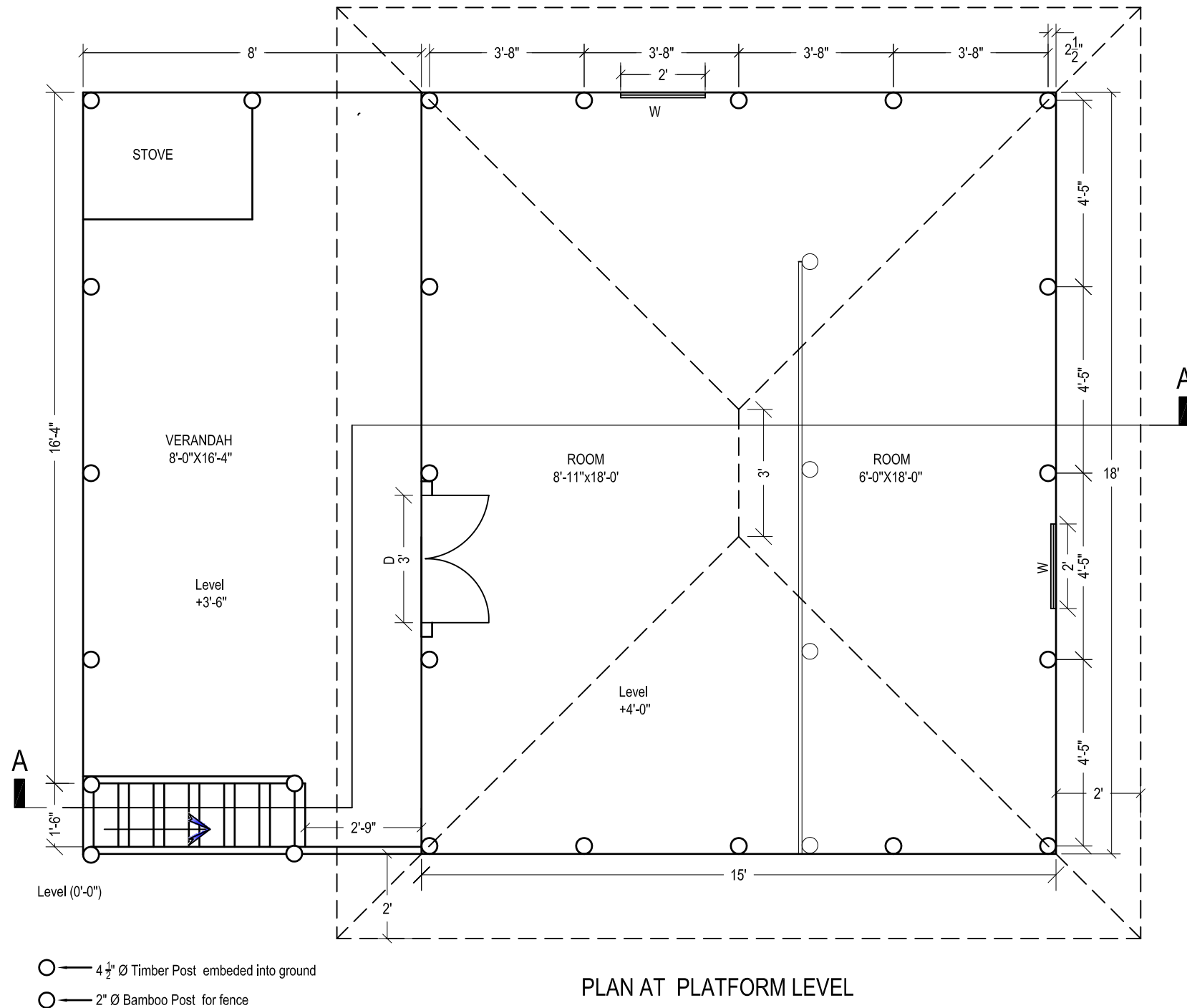
Ceiling is considered to protect heat and cold

Wooden tie beams in odd number

Joints: Nails, notches, GI wire, plastic ropes

Cost: Tk. 90,000

Treatment (bamboo & wood): Water treatment & partial chemical treatment



PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: LIMUJHIRI PARA, BANDARBAN

TYPE 1 : MACHAN HOUSE

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

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2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

Md. ABU SAYED RASHED

CLIENT

CARITAS  
BANGLADESH

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CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

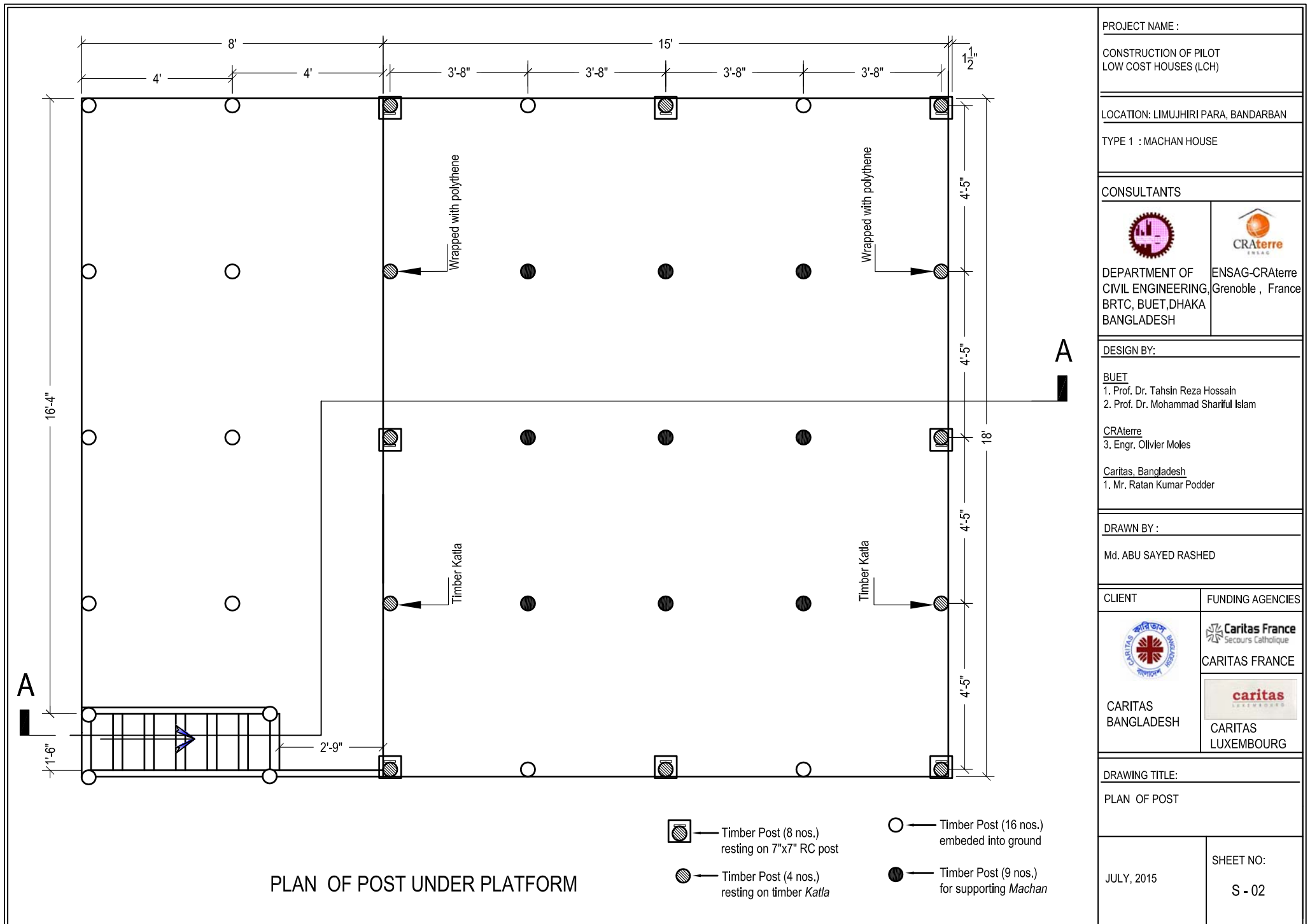
PLAN

JULY, 2015

SHEET NO:

S - 01





PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: LIMUJHIRI PARA, BANDARBAN

TYPE 1 : MACHAN HOUSE

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

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CRAterre

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Caritas, Bangladesh

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CLIENT

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CARITAS FRANCE

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LUXEMBOURG

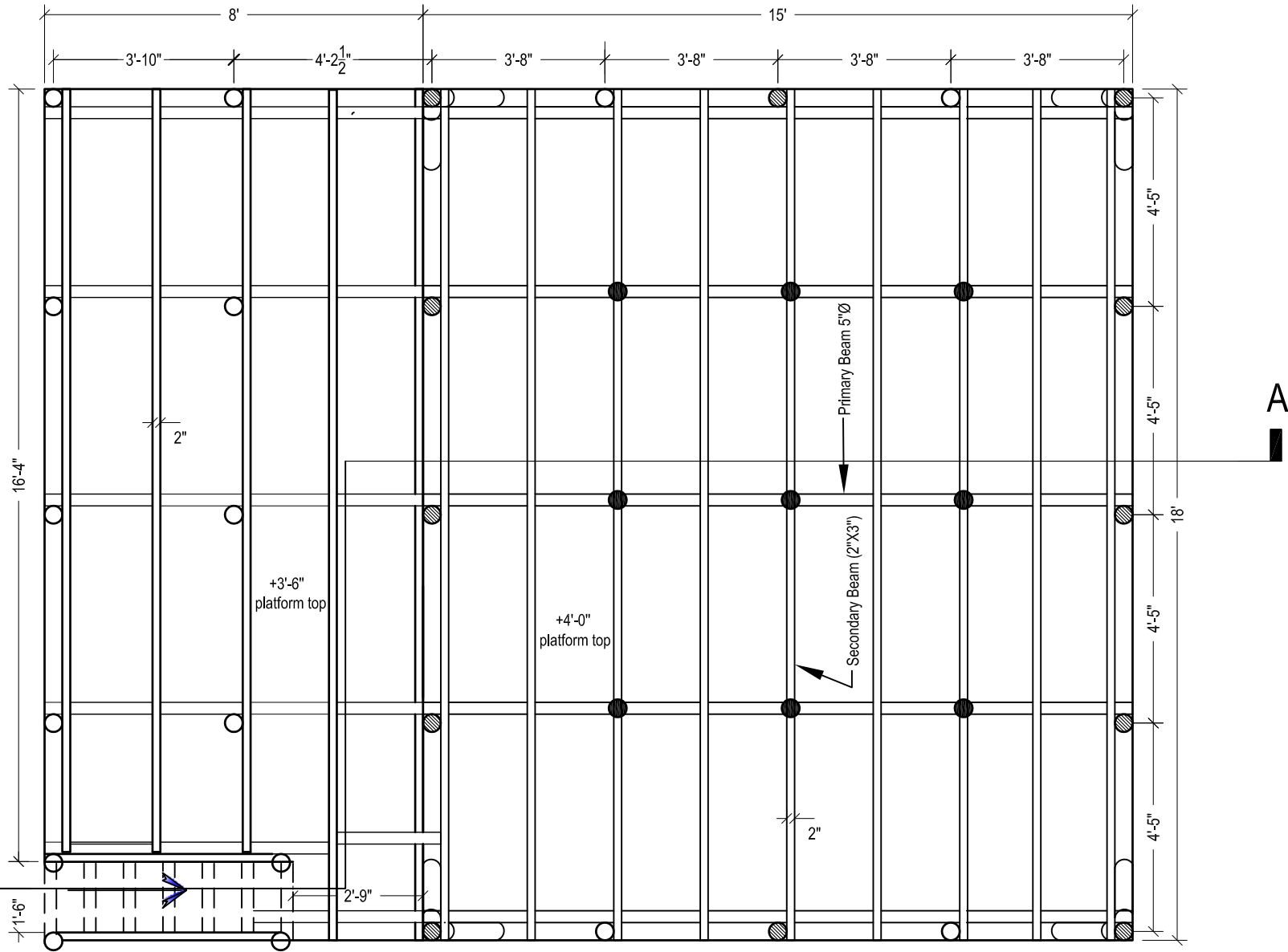
DRAWING TITLE:

PLAN OF POST

JULY, 2015

SHEET NO:

S - 02



PLAN OF POST AND BEAM UNDER PLATFORM








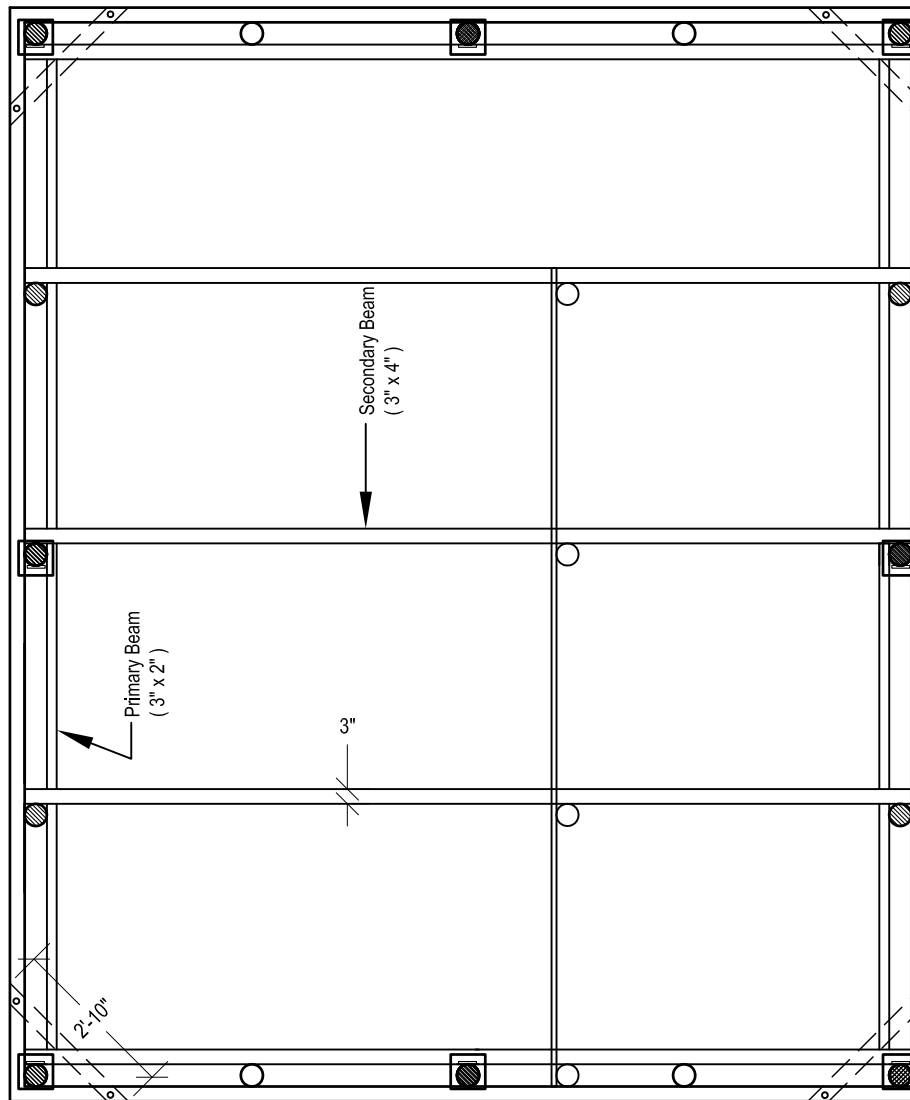
Timber Post (8 nos.)  
resting on 7'x7' RC post

○ Timber Post (16 nos.)  
embedded into ground




● Timber Post (9 nos.)  
for supporting Machan






◐ Timber Post (4 nos.)  
resting on timber Katla

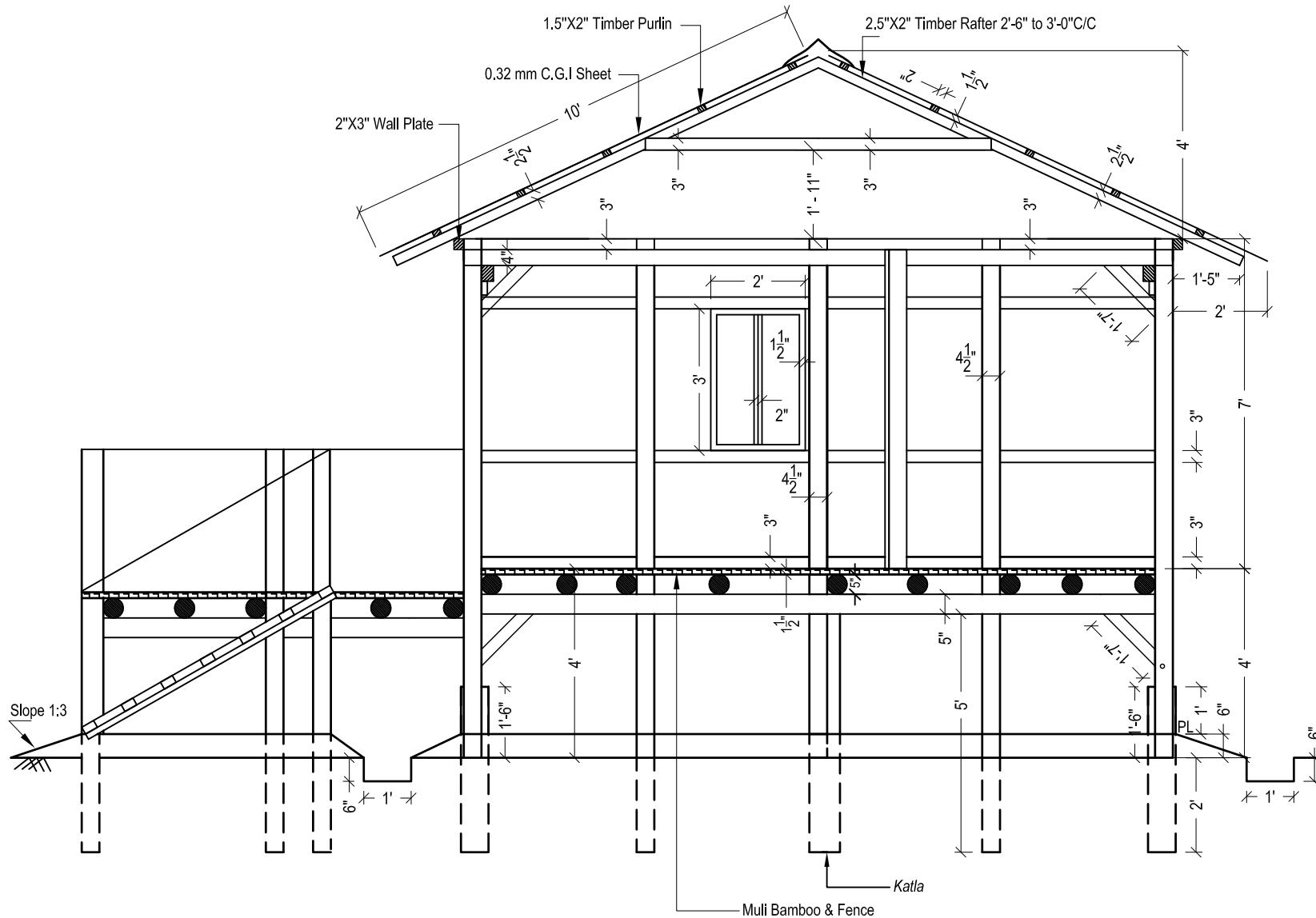
PROJECT NAME :	
CONSTRUCTION OF PILOT LOW COST HOUSES (LCH)	
LOCATION: LIMUJHIRI PARA, BANDARBAN	
TYPE 1 : MACHAN HOUSE	
CONSULTANTS	
 DEPARTMENT OF CIVIL ENGINEERING, BRTC, BUET, DHAKA BANGLADESH	 ENSAG-CRAterre Grenoble , France
DESIGN BY:	
<u>BUET</u> 1. Prof. Dr. Tahsin Reza Hossain 2. Prof. Dr. Mohammad Shariful Islam  <u>CRAterre</u> 3. Engr. Olivier Moles  <u>Caritas, Bangladesh</u> 1. Mr. Ratan Kumar Podder	
DRAWN BY :	
Md. ABU SAYED RASHED	
CLIENT	FUNDING AGENCIES
 CARITAS BANGLADESH	 CARITAS FRANCE   CARITAS LUXEMBOURG
DRAWING TITLE:	
PLAN OF POST AND BEAM UNDER PLATFORM	
JULY, 2015	SHEET NO: S - 03



PLAN OF POST AND BEAM AT ROOF LEVEL

-  Timber Post (8 nos.)  
resting on 7"x7" RC post
-  Timber Post (4 nos.)  
embedded into ground
-  Timber Post (4 nos.)  
resting on timber Katla

PROJECT NAME :	
CONSTRUCTION OF PILOT LOW COST HOUSES (LCH)	
LOCATION: LIMUJHIRI PARA, BANDARBAN	
TYPE 1 : MACHAN HOUSE	
CONSULTANTS	
 DEPARTMENT OF CIVIL ENGINEERING, BRTC, BUET, DHAKA BANGLADESH	 ENSAG-CRAterre Grenoble , France
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DRAWN BY :	
Md. ABU SAYED RASHED	
CLIENT	FUNDING AGENCIES
 CARITAS BANGLADESH	 CARITAS FRANCE   CARITAS LUXEMBOURG
DRAWING TITLE:	
PLAN OF POST AND BEAM AT ROOF LEVEL	
JULY, 2015	SHEET NO: S - 04



SECTION : A - A

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: LIMUJHIRI PARA, BANDARBAN

TYPE 1 : MACHAN HOUSE

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble, France

DESIGN BY:

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CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

Md. ABU SAYED RASHED

CLIENT

CARITAS  
BANGLADESH

FUNDING AGENCIES



CARITAS FRANCE

CARITAS  
LUXEMBOURG

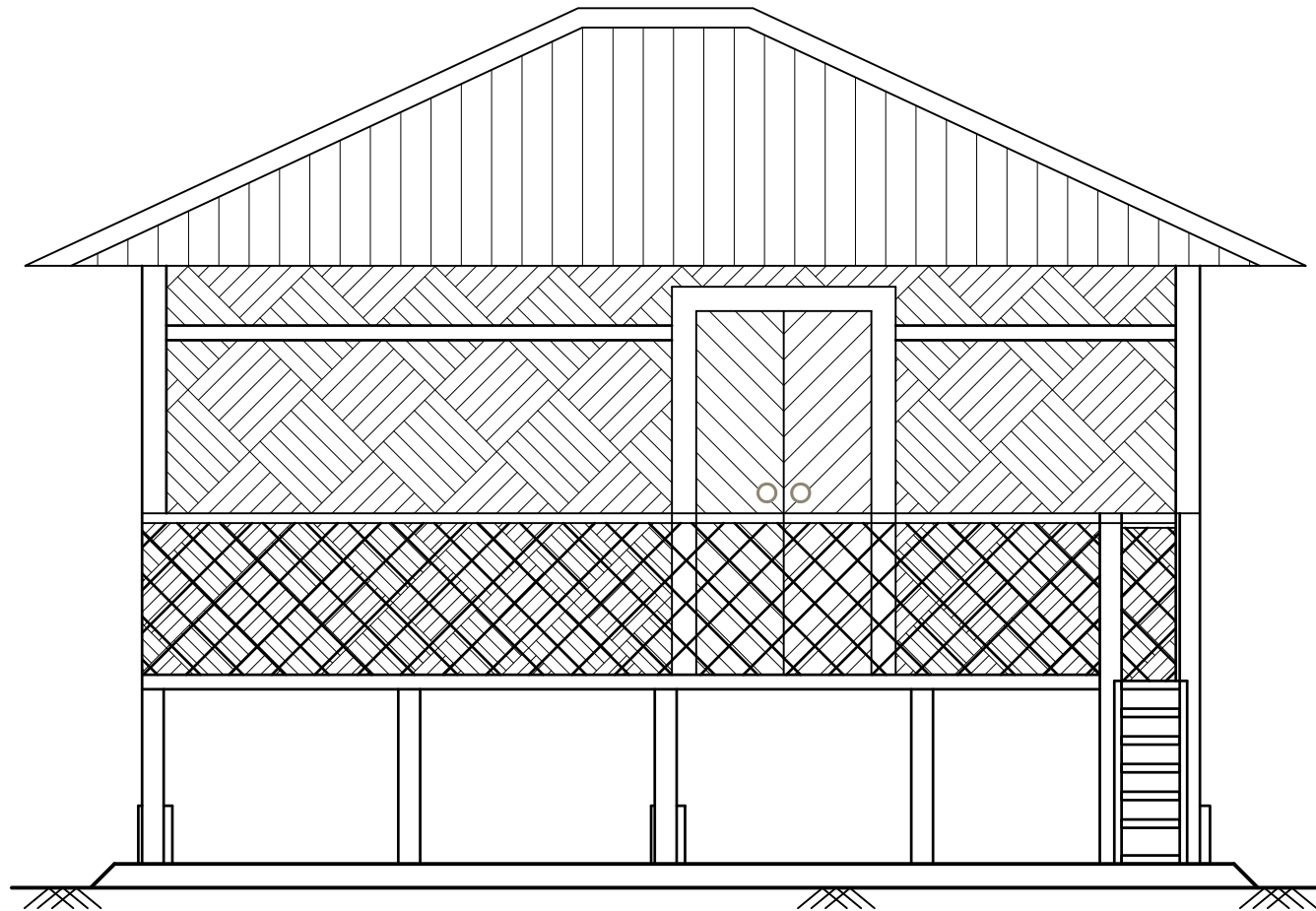
DRAWING TITLE:

SECTION: A - A

JULY, 2015

SHEET NO:

S - 05



FRONT ELEVATION

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: LIMUJHIRI PARA, BANDARBAN

TYPE 1 : MACHAN HOUSE

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRATERRE  
Grenoble , France

DESIGN BY:

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CRATERRE

3. Engr. Olivier Moles

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1. Mr. Ratan Kumar Podder

DRAWN BY :

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CLIENT

CARITAS  
BANGLADESH

FUNDING AGENCIES



CARITAS FRANCE

CARITAS  
LUXEMBOURG

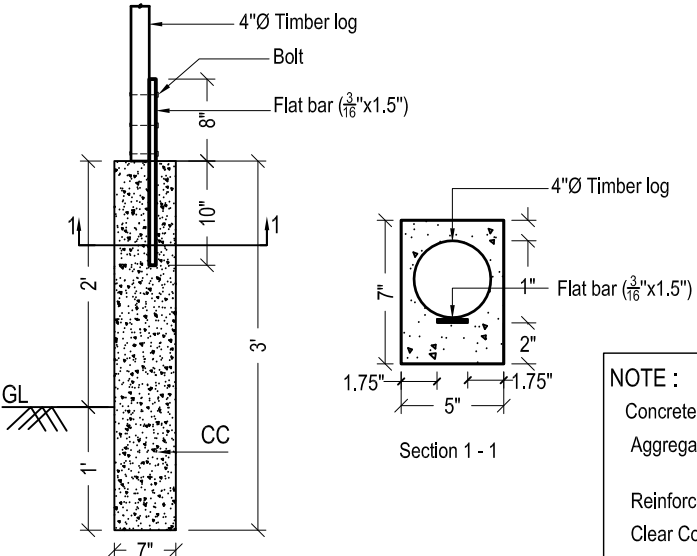
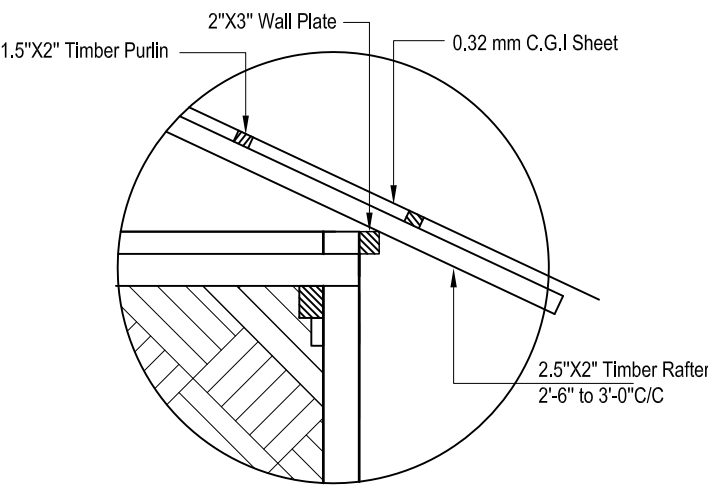


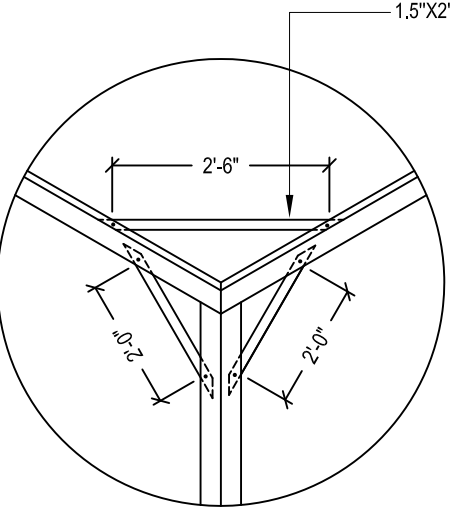
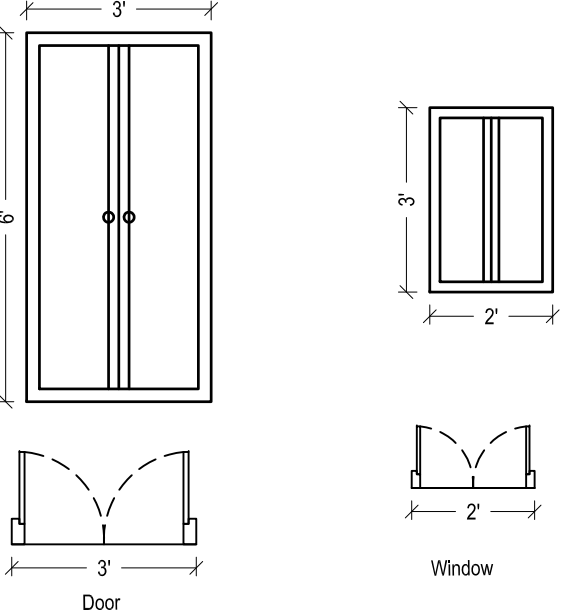
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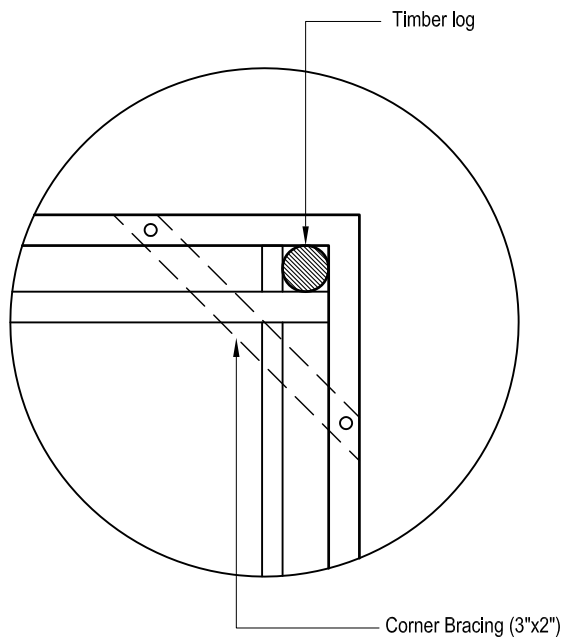
FRONT ELEVATION

JULY, 2015

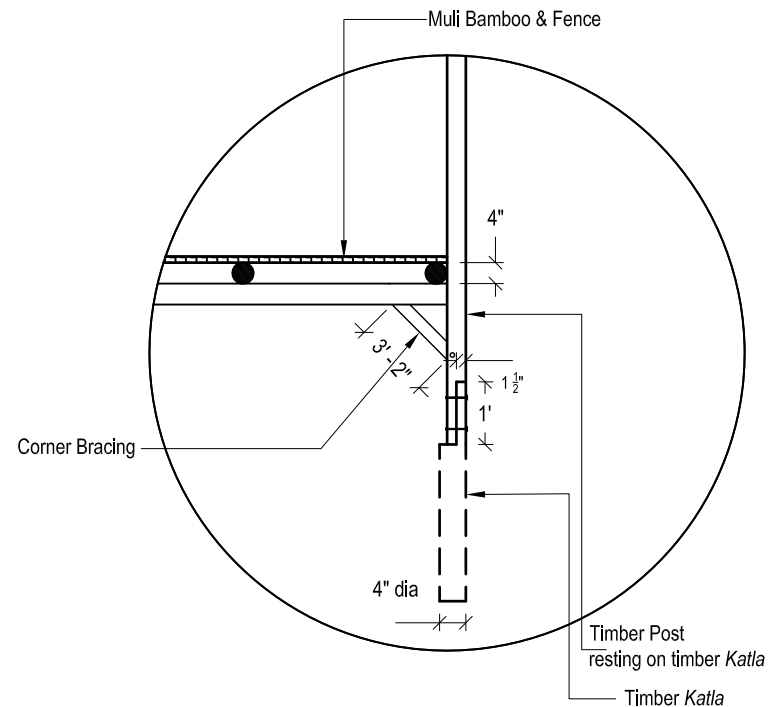
SHEET NO:

S - 06

 <p>4"Ø Timber log</p> <p>Bolt</p> <p>Flat bar (<math>\frac{3}{16}</math>"x1.5")</p> <p>1"</p> <p>2"</p> <p>10"</p> <p>3"</p> <p>7"</p> <p>GL</p> <p>CC</p> <p>4"Ø Timber log</p> <p>Flat bar (<math>\frac{3}{16}</math>"x1.5")</p> <p>1"</p> <p>7"</p> <p>1.75"</p> <p>5"</p> <p>1.75"</p> <p>Section 1 - 1</p> <p><b>NOTE :</b></p> <p>Concrete - 1 : 2 : 4</p> <p>Aggregate - Brick Chips</p> <p>- Sylhet Sand</p> <p>Reinforcement - 60 Grade</p> <p>Clear Cover - <math>\frac{3}{4}</math>"</p>	 <p>2"X3" Wall Plate</p> <p>1.5"X2" Timber Purlin</p> <p>0.32 mm C.G.I Sheet</p> <p>2.5"X2" Timber Rafter 2'-6" to 3'-0"C/C</p>	<p>PROJECT NAME :</p> <p>CONSTRUCTION OF PILOT LOW COST HOUSES (LCH)</p> <p>LOCATION: LIMUJHIRI PARA, BANDARBAN</p> <p>TYPE 1 : MACHAN HOUSE</p> <p>CONSULTANTS</p> <div>  <p>DEPARTMENT OF CIVIL ENGINEERING, BRTC, BUET,DHAKA BANGLADESH</p> </div> <div>  <p>ENSAG-CRAtterre Grenoble , France</p> </div> <p>DESIGN BY:</p> <p>BUET</p> <p>1. Prof. Dr. Tahsin Reza Hossain</p> <p>2. Prof. Dr. Mohammad Shariful Islam</p> <p>CRAtterre</p> <p>3. Engr. Olivier Moles</p> <p>Caritas, Bangladesh</p> <p>1. Mr. Ratan Kumar Podder</p>
<p>Detail 01: Concrete <i>Katla</i></p>  <p>1.5"X2"</p> <p>2'-6"</p> <p>2'-0"</p> <p>2'-0"</p>	<p>Detail 03: Corner Bracing and Roof Arrangement</p>  <p>3'</p> <p>6'</p> <p>3'</p> <p>2'</p> <p>3'</p> <p>2'</p> <p>Door</p> <p>Window</p>	<p>DRAWN BY :</p> <p>Md. ABU SAYED RASHED</p> <p>CLIENT</p> <p>CARITAS BANGLADESH</p> <p>FUNDING AGENCIES</p> <p>Caritas France Secours Catholique</p> <p>CARITAS FRANCE</p> <p>caritas LUXEMBOURG</p> <p>CARITAS LUXEMBOURG</p> <p>DRAWING TITLE:</p> <p>DETAILS</p> <p>JULY, 2015</p> <p>SHEET NO:</p> <p>S - 07</p>
<p>Detail 02: Corner Bracing</p>	<p>Detail 04: Door &amp; Window</p>	



Detail 05: Corner Bracing under Platform



Detail 06: Corner Bracing and Wooden Katla

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: LIMUJHIRI PARA, BANDARBAN

TYPE 1 : MACHAN HOUSE

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

Md. ABU SAYED RASHED

CLIENT

CARITAS  
BANGLADESH

FUNDING AGENCIES



CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

DETAILS

JULY, 2015

SHEET NO:

S - 08



MEMBER SCHEDULE				
SL.	ITEMS NAME	DIMENSIONS	MATERIALS NAME	REMARKS
1.	Timber Katla	Variable	Timber	Round Log
2.	Primary Beam (Bottom)	5"Ø	Timber	Round Log
3.	Secondary Beam (Bottom)	2"X3"	Timber	
4.	Primary Beam (Top)	3"X2"	Timber	
5.	Secondary Beam (Top)	3"X4"	Timber	
6.	Bottom Bracing	3"X2"	Timber	
7.	Top Bracing	3"X2"	Timber	
8.	Purlin	1.5"X2"	Timber	
10.	Rafter	2.5"X2"	Timber	
11.	Tie Beam	2"X3"	Timber	
12.	Window	2'-0"x3'-0"	Timber	Position may be Changed
13.	Door	3'-0"x6'-0"	Timber	Position may be Changed
14.	Long Post	Min. Ø 4.5"	Timber	Round Log
15.	Short Post	Min. Ø 4.5"	Timber	Round Log
16.	Concrete Post	7"x7"x3'-6"	CC	Ratio= 1:2:4
17.	Angle Bar (Katla)	2"x $\frac{3}{8}$ "x1'-6"	Steel	10" in concrete, 8" open to joint bolt
18.	Machan		Bamboo	
19.	CGI Sheet	0.32 mm	CGI	
19.	Drain	1'x0'-6"		

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: LIMUJHIRI PARA, BANDARBAN

TYPE 1 : MACHAN HOUSE

CONSULTANTS

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CRAterre

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FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

MEMBER SCHEDULE

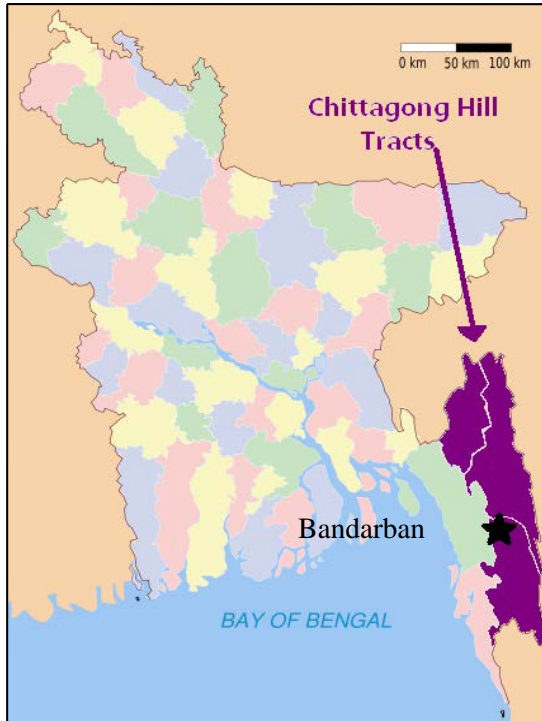
JULY, 2015

SHEET NO:

S - 09

## DIVISION: CHITTAGONG

### 10. DESIGN OF LCH IN BANDARBAN: TYPE – 2



#### SITE TOPOGRAPHY



#### General Information:

##### Location:

District: Bandarban  
Upazila: Bandarban Sadar  
Union: Sadar  
Mouza/ Village: Lemujhiri para

##### Climatic Feature: Hot, cold and rainy

Avg. Maximum Temperature: 35 °C  
Avg. Minimum temperature: 13°C  
Annual Rainfall: 3031 mm  
Average Relative Humidity: 76%

##### Geotechnical Feature:

Topography: hilly  
MSL: 21 m  
Soil Characteristics: Sandy soil over stone soil, Coarse sand (in valley) and Silt (in hill)

##### Disaster:

Flash flood, cyclone, tidal surge, Landslides due to heavy rain, earthquake, fire, northwester/tornado



Completed House

#### Design Considerations:

Available Building Materials: Mud, Bamboo, Brick, GI wire, CGI sheets, Straw, Wood etc

Foundation: Wooden/ Bamboo posts embedded in soil (1-2 ft)

Plinth: Mud

Post: Wooden pole with *katla*

Fence/Wall: Bamboo mat (2 parts)

Openings: 1 main door + 1 inside door to connect rooms

Ceiling: Ceiling is considered to protect heat and cold

Joints: Nails, notches, GI wire, plastic ropes

Treatment (bamboo & wood): Water treatment & partial chemical treatment

Roof Type: Four pitched

roof disconnected from main roof

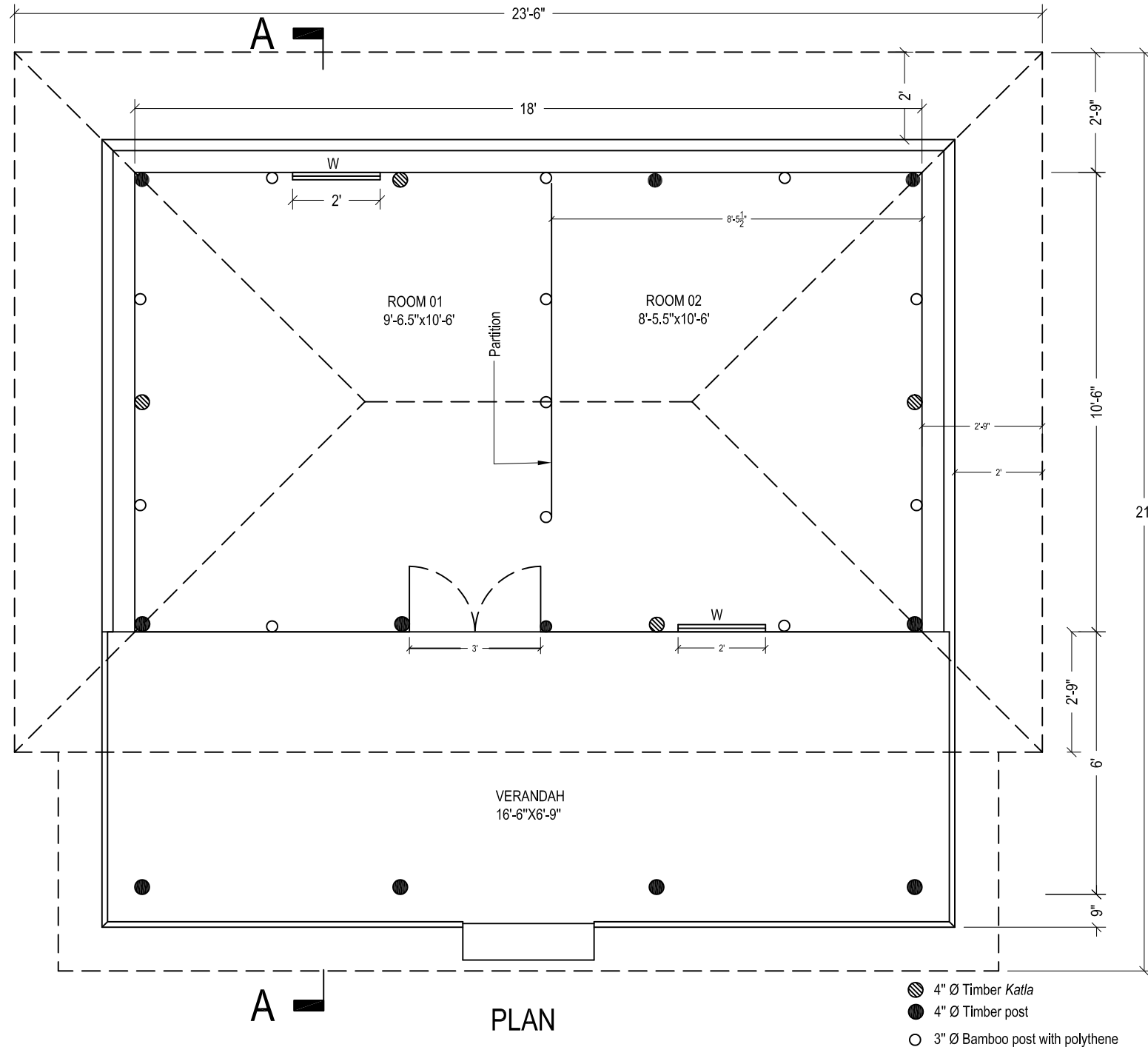
Roof cover: CGI sheet

Roof structure: Wooden truss

Bracing: Corner bracing

Wooden tie beams in odd number

Cost: Tk. 90,000



PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: LIMUJHIRI PARA, BANDARBAN

TYPE 2 : HOUSE OF GROUND

CONSULTANTS

DEPARTMENT OF  
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BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

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CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

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DRAWING TITLE:

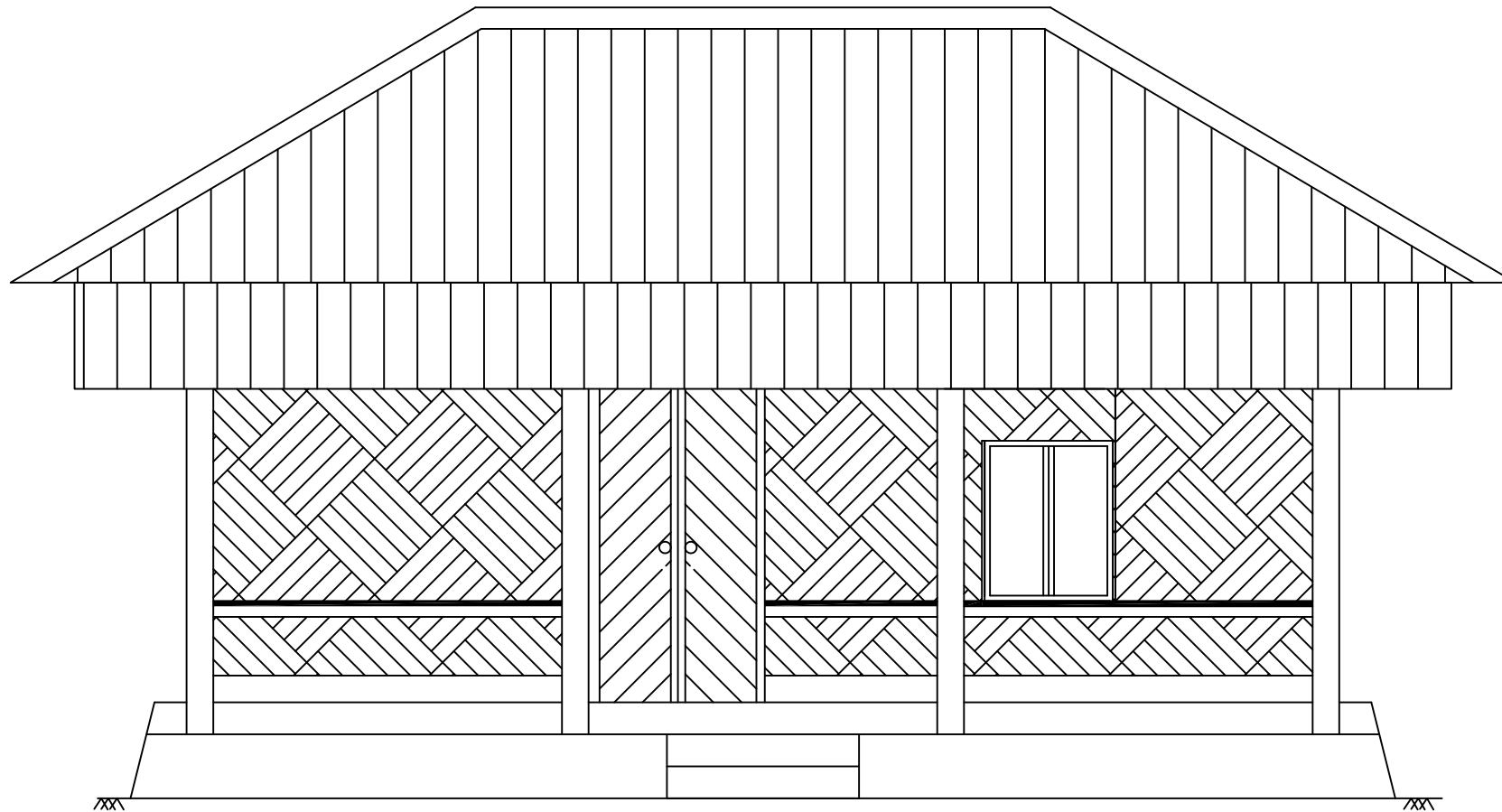
PLAN

July, 2015

SHEET NO:

S - 01

<b>PROJECT NAME :</b>	
<b>CONSTRUCTION OF PILOT LOW COST HOUSES (LCH)</b>	
<b>LOCATION: LIMUJHIRI PARA, BANDARBAN</b>	
<b>TYPE 2 : HOUSE OF GROUND</b>	
<b>CONSULTANTS</b>	
 <p><b>DEPARTMENT OF CIVIL ENGINEERING, BRTC, BUET,DHAKA BANGLADESH</b></p>	 <p><b>ENSAG-CRATERre Grenoble , France</b></p>
<b>DESIGN BY:</b>	
<p><u>BUET</u>  1. Prof. Dr. Tahsin Reza Hossain  2. Prof. Dr. Mohammad Shariful Islam</p> <p><u>CRATERre</u>  3. Engr. Olivier Moles</p> <p><u>Caritas, Bangladesh</u>  1. Mr. Ratan Kumar Podder</p>	
<b>DRAWN BY :</b>	
Md. ABU SAYED RASHED	
<b>CLIENT</b>	<b>FUNDING AGENCIES</b>
 <p><b>CARITAS BANGLADESH</b></p>	 <p><b>Caritas France</b>  Secours Catholique</p> <p><b>CARITAS FRANCE</b></p>  <p><b>CARITAS LUXEMBOURG</b></p>
<b>DRAWING TITLE:</b>	
<b>SECTION: A - A</b>	
July, 2015	<b>SHEET NO:</b>  <b>S - 02</b>



FRONT ELEVATION

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: LIMUJHIRI PARA, BANDARBAN

TYPE 2 : HOUSE OF GROUND

CONSULTANTS

DEPARTMENT OF  
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CRAtterre

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CARITAS  
BANGLADESH

FUNDING AGENCIES



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CARITAS  
LUXEMBOURG

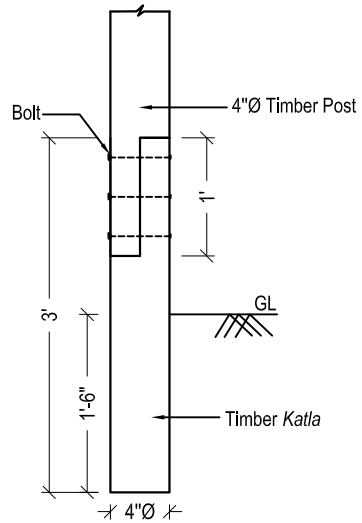
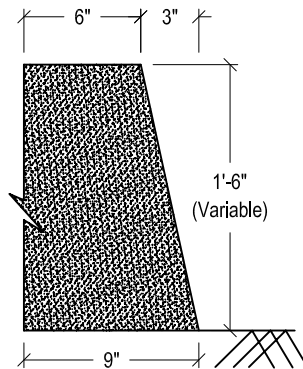
DRAWING TITLE:

FRONT ELEVATION

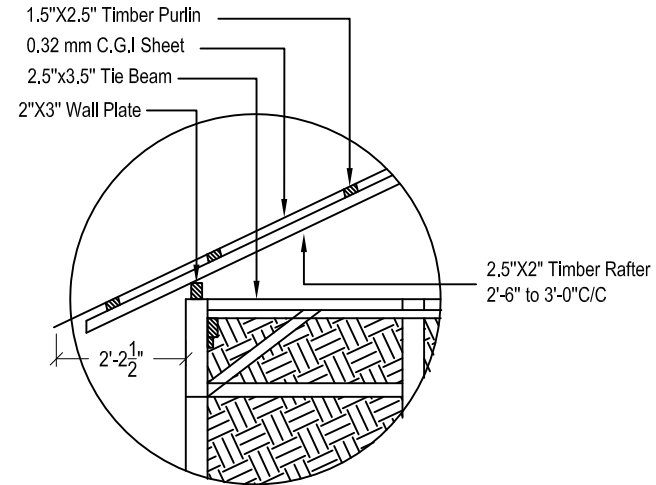
July, 2015

SHEET NO:

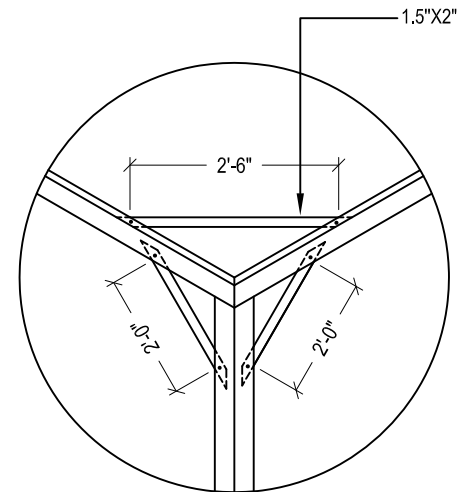
S - 03

Detail 01: Timber *Katla*

Detail 02: Plinth



Detail 03: Corner Bracing and Roof Arrangement



Detail 04: Corner Bracing

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: LIMUJHIRI PARA, BANDARBAN

TYPE 2 : HOUSE OF GROUND

CONSULTANTS

DEPARTMENT OF  
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Grenoble , France

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CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

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FUNDING AGENCIES



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CARITAS  
LUXEMBOURG

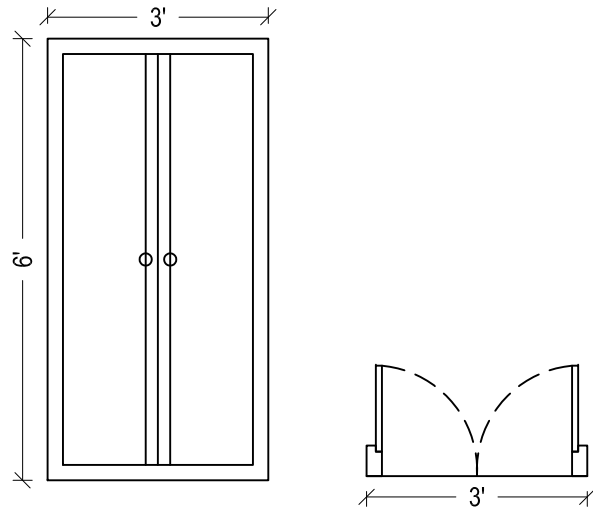
DRAWING TITLE:

DETAIL

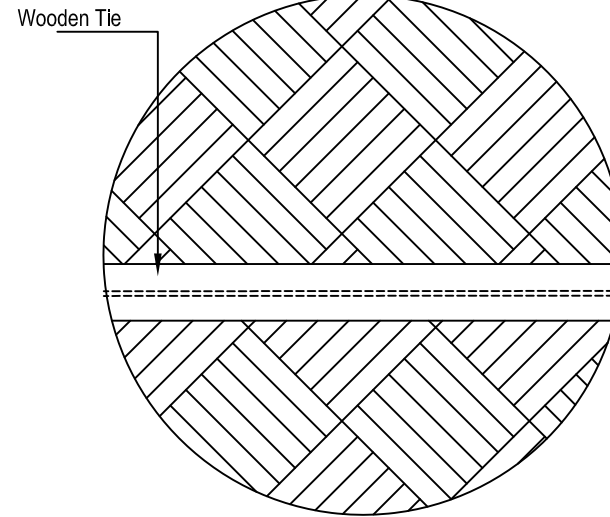
July, 2015

SHEET NO:

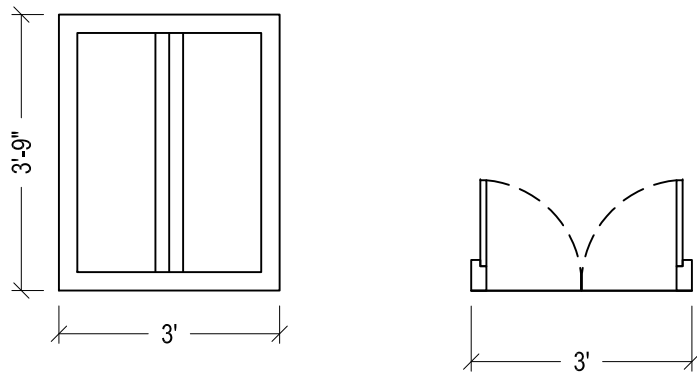
S - 04



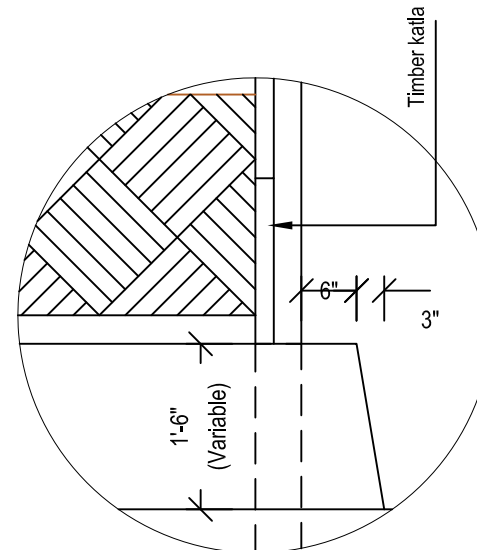
Detail 05: Door



Detail 07: Double Part Fence Joint



Detail 06: Window



Detail 08: Plinth

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: LIMUJHIRI PARA, BANDARBAN

TYPE 2 : HOUSE OF GROUND

CONSULTANTS

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CRAterre

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Caritas, Bangladesh

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CARITAS  
BANGLADESH

FUNDING AGENCIES



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CARITAS  
LUXEMBOURG

DRAWING TITLE:

DETAIL

July, 2015

SHEET NO:

S - 05



MEMBER SCHEDULE				
SL.	ITEMS NAME	DIMENSIONS	MATERIALS NAME	REMARKS
1.	Timber post	Min Ø 4"	Timber	Round Log, katla at 4-corner. Other posts wrapped with polythene
2.	Purlin	1.5"X2.5"	Timber	
3.	Rafter	2.5"X2"	Timber	
4.	Beam	2.5"X3.5"	Timber	
5.	Window	2'-6"x2'-0"	Timber	Position may be changed
6.	Door	3'-0"x6'-0"	Timber	Position may be changed
7.	CGI Sheet (Roof)	Min 0.32 mm	CGI Sheet	
8.	Top tie	1.5"x3"	Timber	
9.	Wall Plate	2"x3"	Timber	

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: LIMUJHIRI PARA, BANDARBAN

TYPE 2 : HOUSE OF GROUND

CONSULTANTS

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CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

MEMBER SCHEDULE

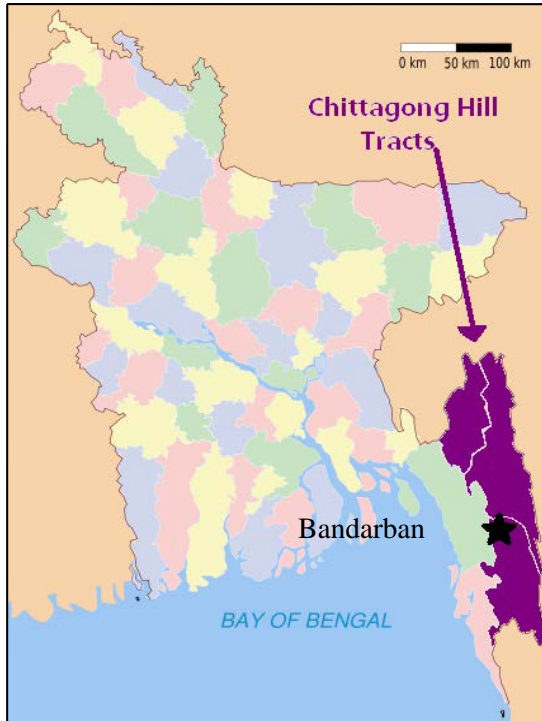
July, 2015

SHEET NO:

S - 06

## DIVISION: CHITTAGONG

### 11. DESIGN OF LCH IN BANDARBAN: TYPE – DP 1.1



#### SITE TOPOGRAPHY



#### General Information:

##### Location:

District: Bandarban  
Upazila: Bandarban Sadar  
Union: Sadar  
Mouza/ Village: Lemujhiri para

##### Climatic Feature: Hot, cold and rainy

Avg. Maximum Temperature: 35 °C  
Avg. Minimum temperature: 13°C  
Annual Rainfall: 3031 mm  
Average Relative Humidity: 76%

##### Geotechnical Feature:

Topography: hilly  
MSL: 21 m  
Soil Characteristics: Sandy soil over stone soil, Coarse sand (in valley) and Silt (in hill)

##### Disaster:

Flash flood, cyclone, tidal surge, Landslides due to heavy rain, earthquake, fire, northwester/tornado



Completed House

#### Design Considerations:

Available Building Materials: Mud, Bamboo, Brick, GI wire, CGI sheets, Straw, Wood etc

Foundation: Wooden/ Bamboo posts embedded in soil (1-2 ft)      Roof Type: Four pitched

Plinth: Machan (raised platform) with wooden posts directly in the ground and rest on *katla*

Post: Wooden pole with *katla*

Roof cover: CGI sheet

Fence/Wall: Bamboo mat (2 parts)

Roof structure: Wooden truss

Openings: 1 main door + 1 inside door to connect rooms

Bracing: Corner bracing

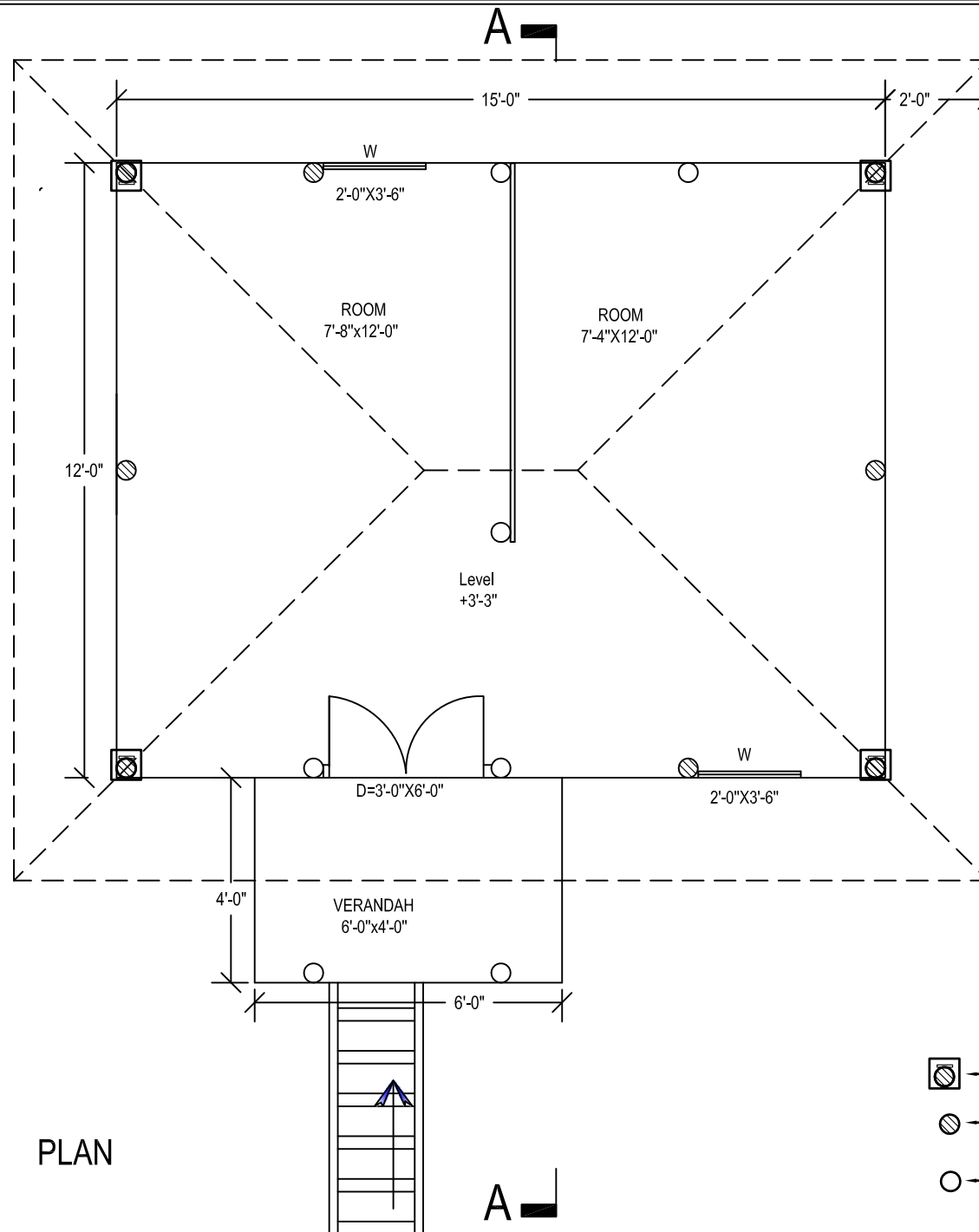
Ceiling: Ceiling is considered to protect heat and cold

Wooden tie beams in odd number

Joints: Nails, notches, GI wire, plastic ropes

Cost: Tk. 75,000

Treatment (bamboo & wood): Water treatment & partial chemical treatment



PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: LIMUJHIRI PARA, BANDARBAN

TYPE DP-1.1: Machan House

CONSULTANTS

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CRAtterre

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CARITAS  
BANGLADESH

FUNDING AGENCIES



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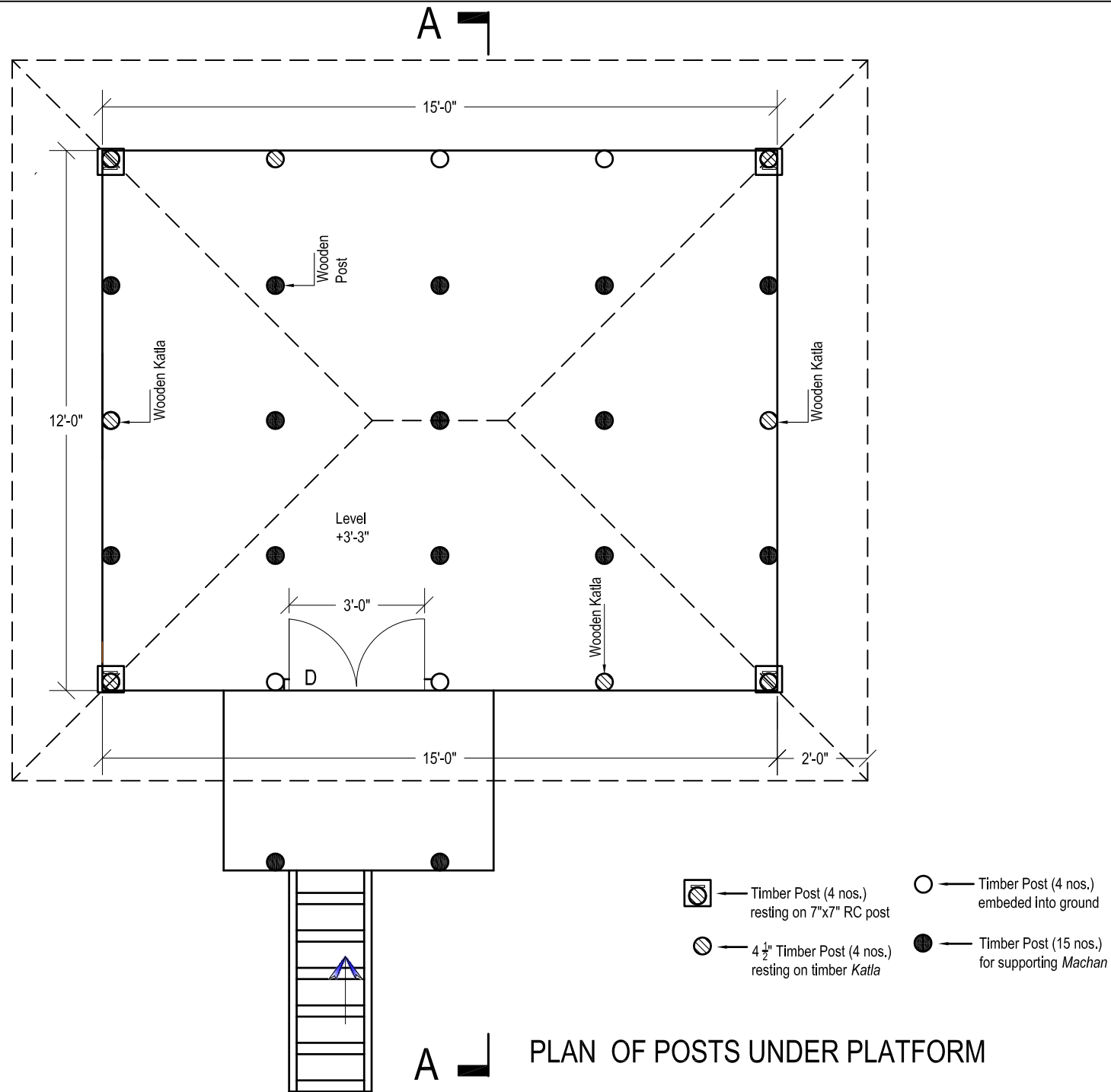
DRAWING TITLE:

PLAN

JULY, 2015

SHEET NO:

S - 01



PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: LIMUJHIRI PARA, BANDARBAN

TYPE DP-1.1: Machan House

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LUXEMBOURG

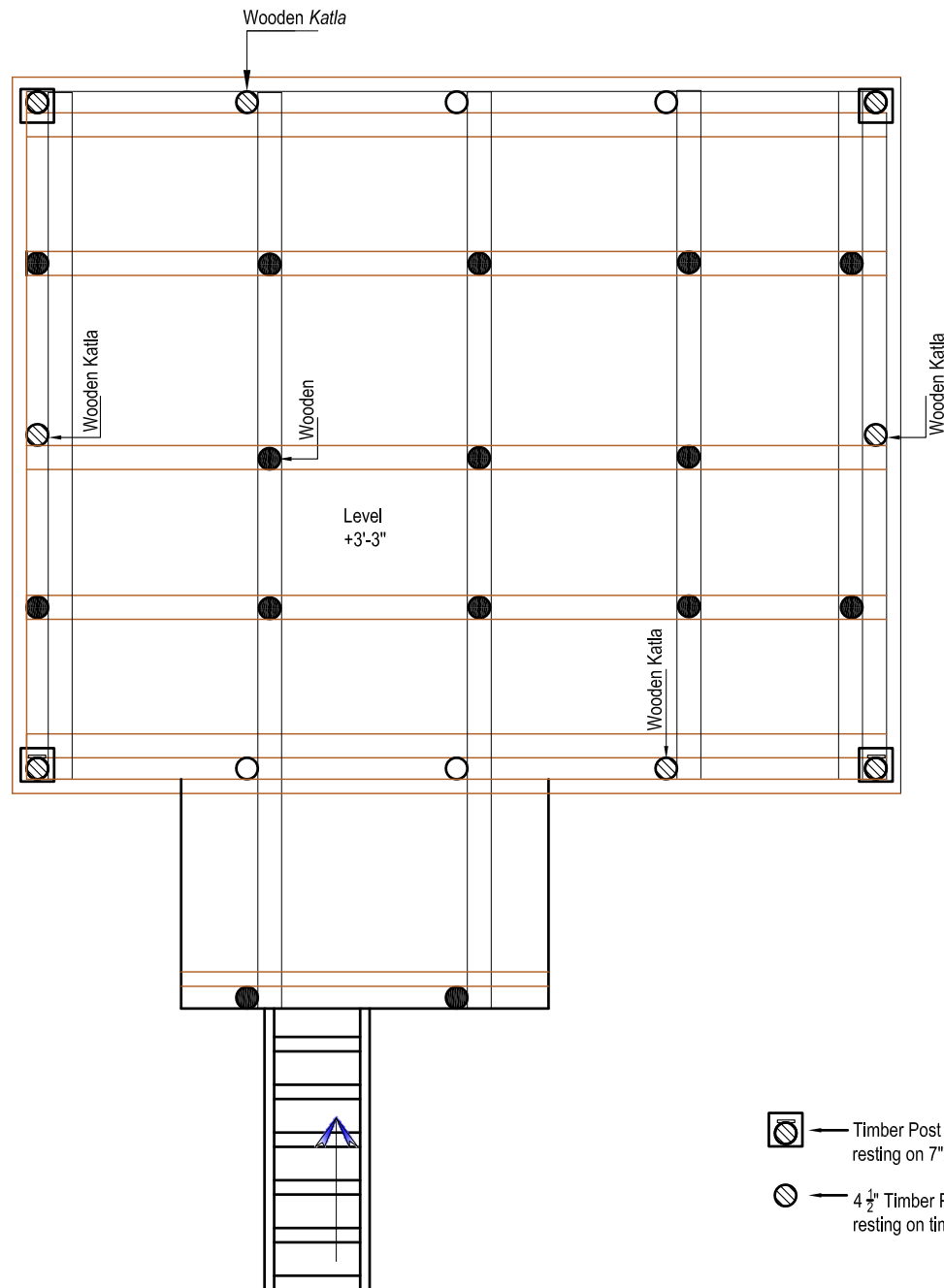
DRAWING TITLE:

PLAN OF POST

JULY, 2015

SHEET NO:

S - 02



PLAN OF POSTS AND BEAMS UNDER PLATFORM

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: LIMUJHIRI PARA, BANDARBAN

TYPE DP-1.1: Machan House

CONSULTANTS



DEPARTMENT OF  
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BANGLADESH



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BANGLADESH

FUNDING AGENCIES



CARITAS FRANCE



CARITAS  
LUXEMBOURG

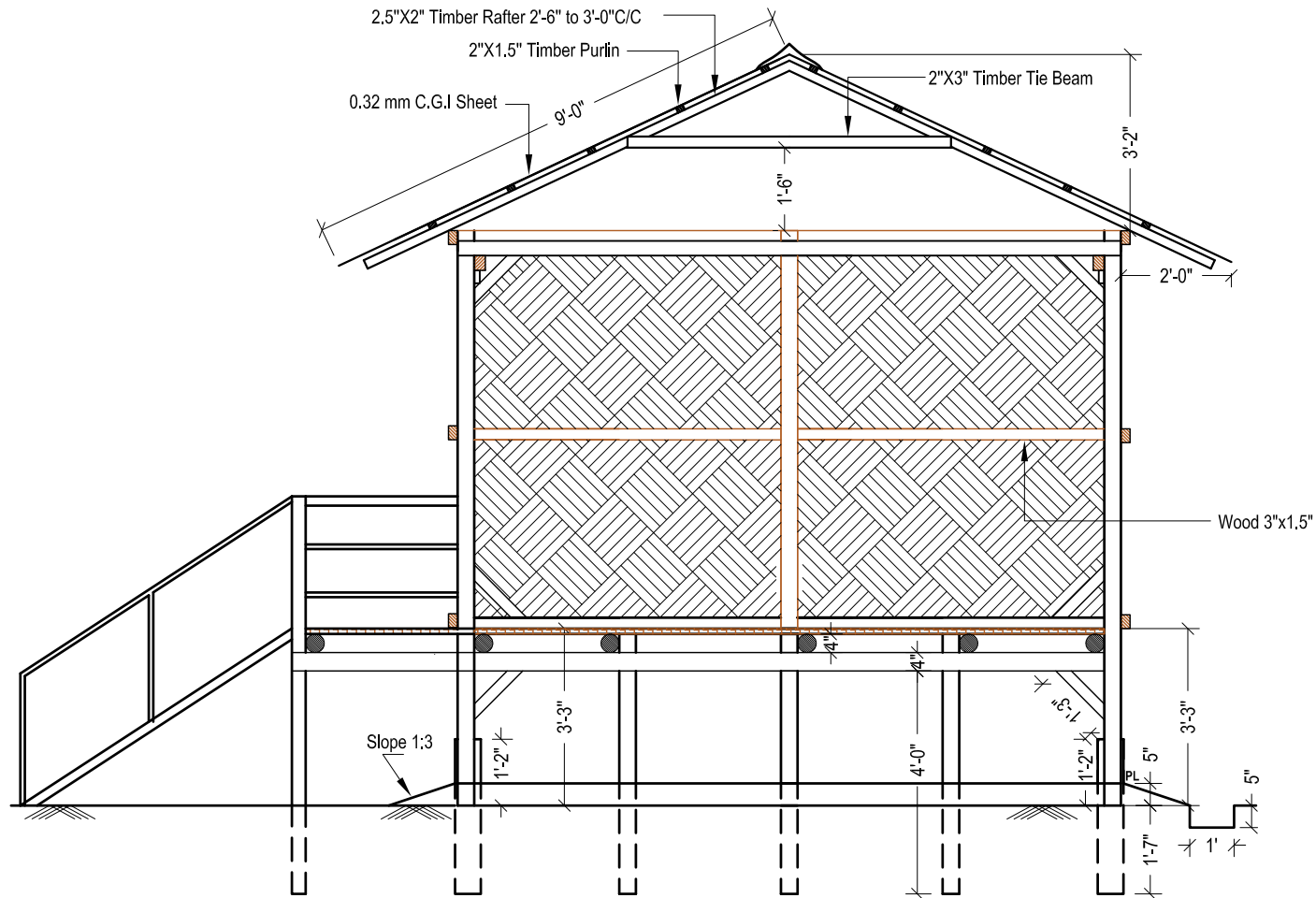
DRAWING TITLE:

PLAN OF POST AND  
BEAM UNDER PLATFORM

JULY, 2015

SHEET NO:

S - 03



SECTION : A - A

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: LIMUJHURI PARA, BANDARBAN

TYPE DP-1.1: Machan House

CONSULTANTS

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BANGLADESH

FUNDING AGENCIES



CARITAS FRANCE

CARITAS  
LUXEMBOURG

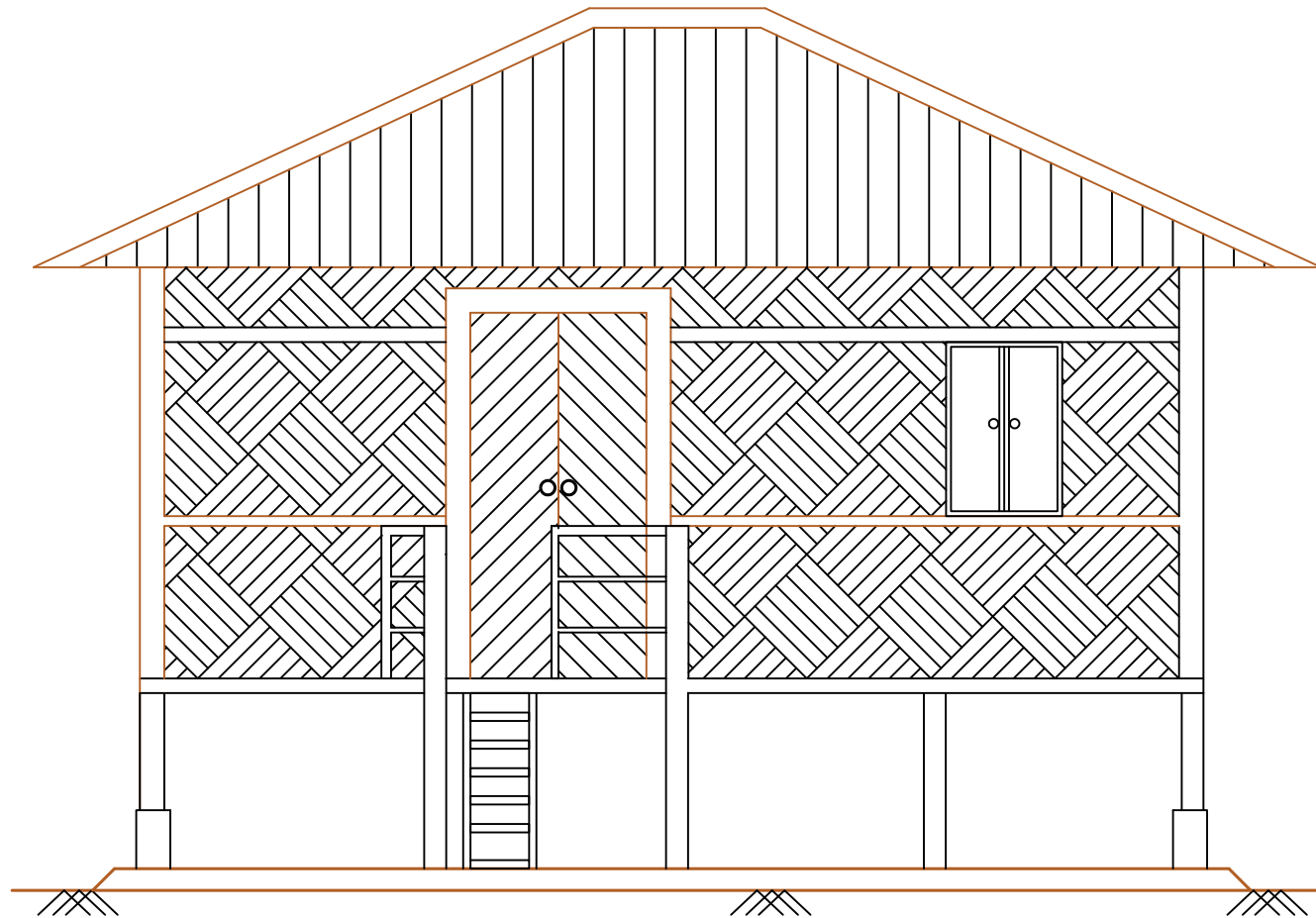
DRAWING TITLE:

SECTION :A-A

JULY, 2015

SHEET NO:

S - 04



FRONT ELEVATION

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: LIMUJHIRI PARA, BANDARBAN

TYPE DP-1.1: Machan House

CONSULTANTS

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CARITAS  
LUXEMBOURG

DRAWING TITLE:

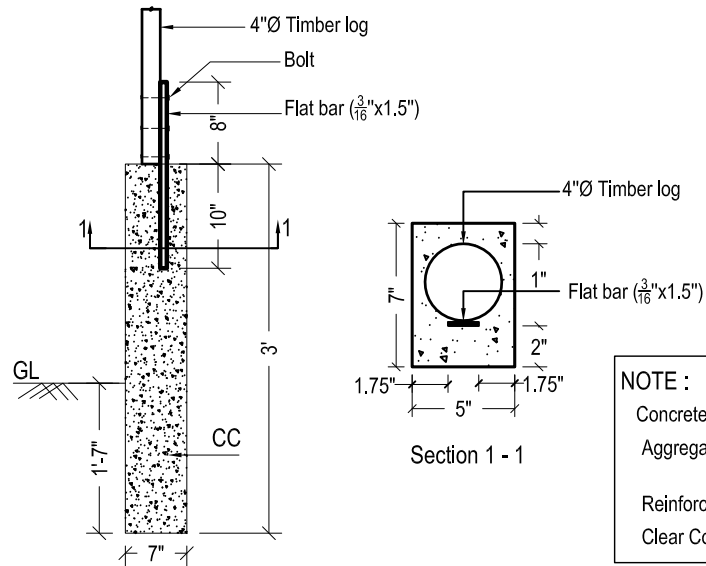
FRONT ELEVATION

JULY, 2015

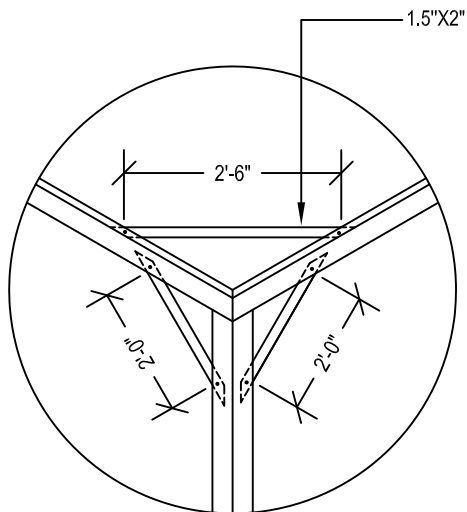
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S - 05

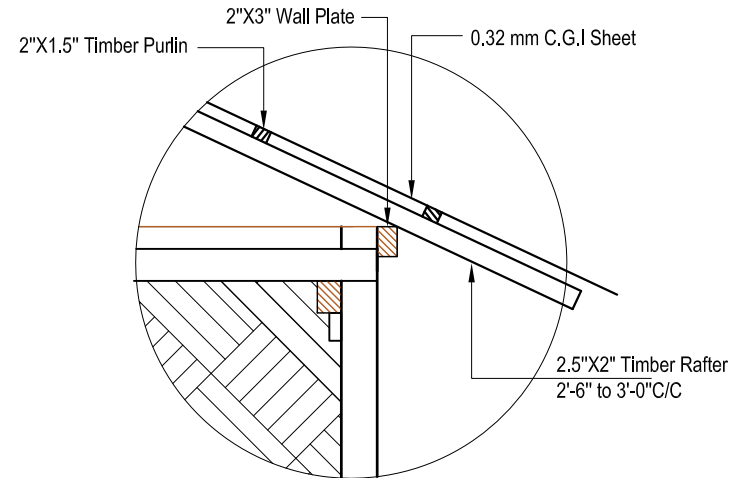




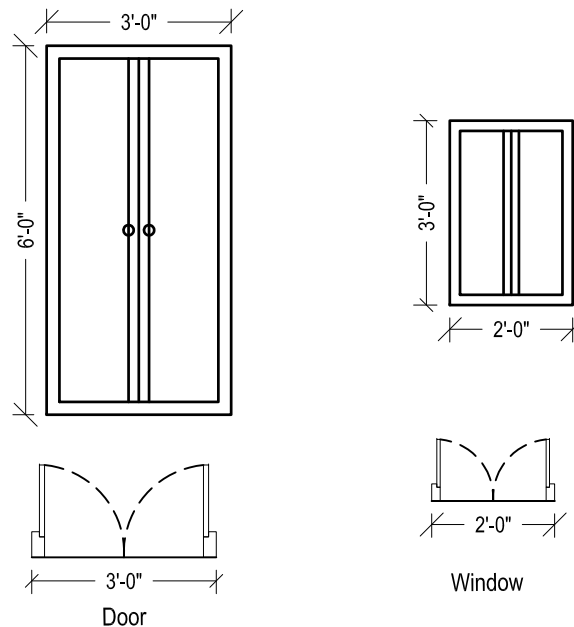
Detail 01: Concrete Katla



Detail 02: Corner Bracing



Detail 03: Corner Bracing and Roof Arrangement



Detail 04: Door and Window

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: LIMUJHIRI PARA, BANDARBAN

TYPE DP-1.1: Machan House

CONSULTANTS

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CARITAS  
BANGLADESH

FUNDING AGENCIES



CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

DETAILS

JULY, 2015

SHEET NO:

S - 06

MEMBER SCHEDULE				
SL.	ITEMS NAME	DIMENSIONS	MATERIALS NAME	REMARKS
1.	Katla	0'-5"x0'-7"x0'-3"	CC	Ratio = 1:2:4
2.	Primary Beam (Bottom)	5"Ø	Timber	Round Log
3.	Secondary Beam (Bottom)	0'-2"x0'-3"	Timber	
4.	Primary Beam (Top)	0'-3"x0'-2"	Timber	
5.	Secondary Beam (Top)	0'-3"x0'-4"	Timber	
6.	Bottom Bracing	3"x2"x2'-8"	Timber	
7.	Top Bracing	3"x2"x2'-10"	Timber	
8.	Purlin	0'-1.5"x0'-2"	Timber	
9.	Rafter	0'-2.5"x0'-2"	Timber	
10.	Tie Beam	0'-2"x0'-3"	Timber	
11.	Window	2'-0"x3'-0"	Timber	Position may be Changed
12.	Door	3'-0"x6'-0"	Timber	Position may be Changed
13.	Long Post	Min. Ø 4.5"	Timber	Round Log
14.	Short Post	Min. Ø 4.5"	Timber	Round Log
15.	Angle Bar	0'- $\frac{3}{16}$ "x0'-1.5"	Steel	10" in concrete, 8" open to joint bolt
16.	Machan	According to Room	Bamboo	
17.	CGI Sheet	0.32 mm	CGI	
18.	Drain	1'-0"x0'-6"		

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: LIMUJHIRI PARA, BANDARBAN

TYPE DP-1.1: Machan House

CONSULTANTS

DEPARTMENT OF  
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DESIGN BY:

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3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

Md. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

MEMBER SCHEDULE

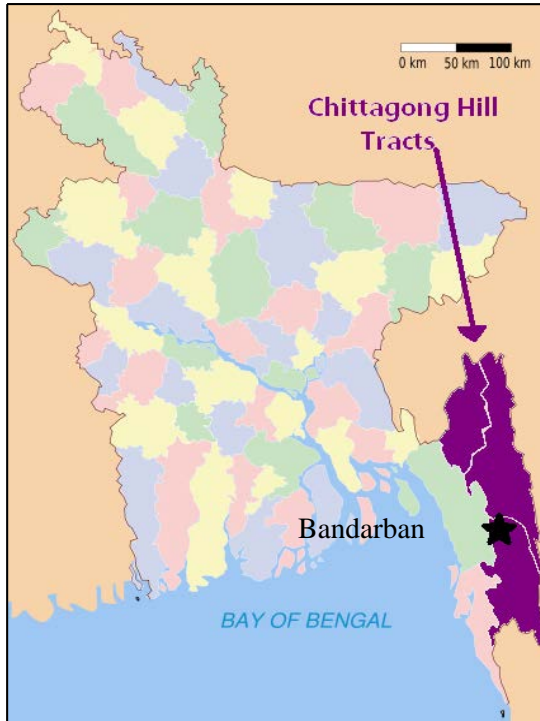
JULY, 2015

SHEET NO:

S - 07

## DIVISION: CHITTAGONG

### 12. DESIGN OF LCH IN BANDARBAN: TYPE – DP 1.2



Bandarban

BAY OF BENGAL

#### SITE TOPOGRAPHY



#### General Information:

##### Location:

District: Bandarban  
Upazila: Bandarban Sadar  
Union: Sadar  
Mouza/ Village: Lemujhiri para

##### Climatic Feature: Hot, cold and rainy

Avg. Maximum Temperature: 35 °C  
Avg. Minimum temperature: 13°C  
Annual Rainfall: 3031 mm  
Average Relative Humidity: 76%

##### Geotechnical Feature:

Topography: hilly  
MSL: 21 m  
Soil Characteristics: Sandy soil over stone soil, Coarse sand (in valley) and Silt (in hill)

Disaster: Flash flood, cyclone, tidal surge, landslides due to heavy rain, earthquake, fire, northwester/ tornado



Completed House

#### Design Considerations:

Available Building Materials: Mud, Bamboo, Brick, GI wire, CGI sheets, Straw, Wood etc

Foundation: Wooden/ Bamboo posts embedded in soil (1-2 ft)

Plinth: Mud

Post: Wooden pole with *katla*

Fence/Wall: Bamboo mat (2 parts)

Openings: 1 main door + 1 inside door to connect rooms

Ceiling: Ceiling is considered to protect heat and cold

Joints: Nails, notches, GI wire, plastic ropes

Treatment (bamboo & wood): Water treatment & partial chemical treatment

Roof Type: Four pitched and veranda  
roof is disconnected from main roof

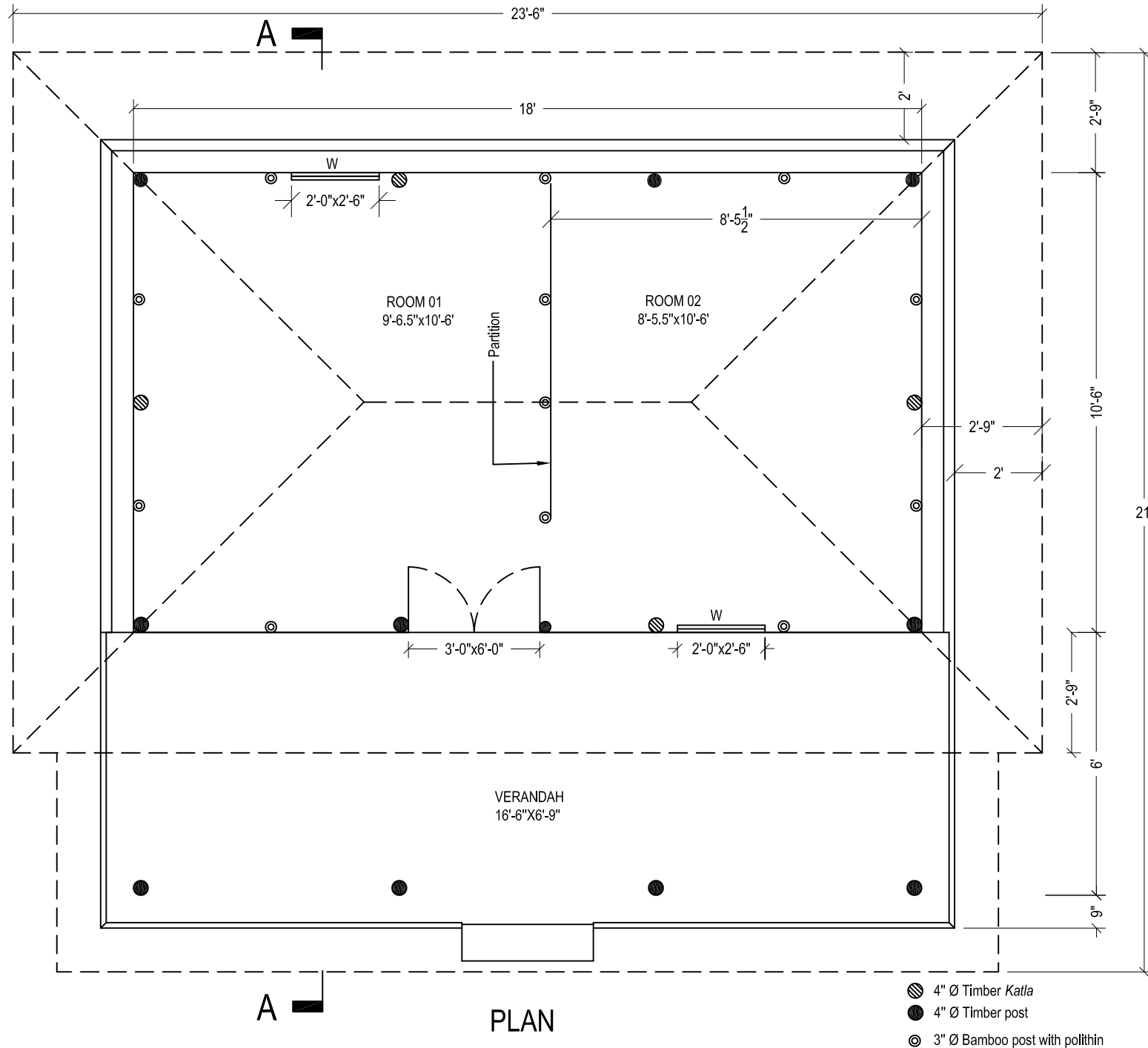
Roof cover: CGI sheet

Roof structure: Wooden truss

Bracing: Corner bracing

Wooden tie beams in odd number

Cost: Tk. 80,000



PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: LIMUJHIRI PARA, BANDARBAN

TYPE DP-2 : House on Ground

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

Md. ABU SAYED RASHED

CLIENT

CARITAS  
BANGLADESH

FUNDING AGENCIES



CARITAS FRANCE

CARITAS  
LUXEMBOURG

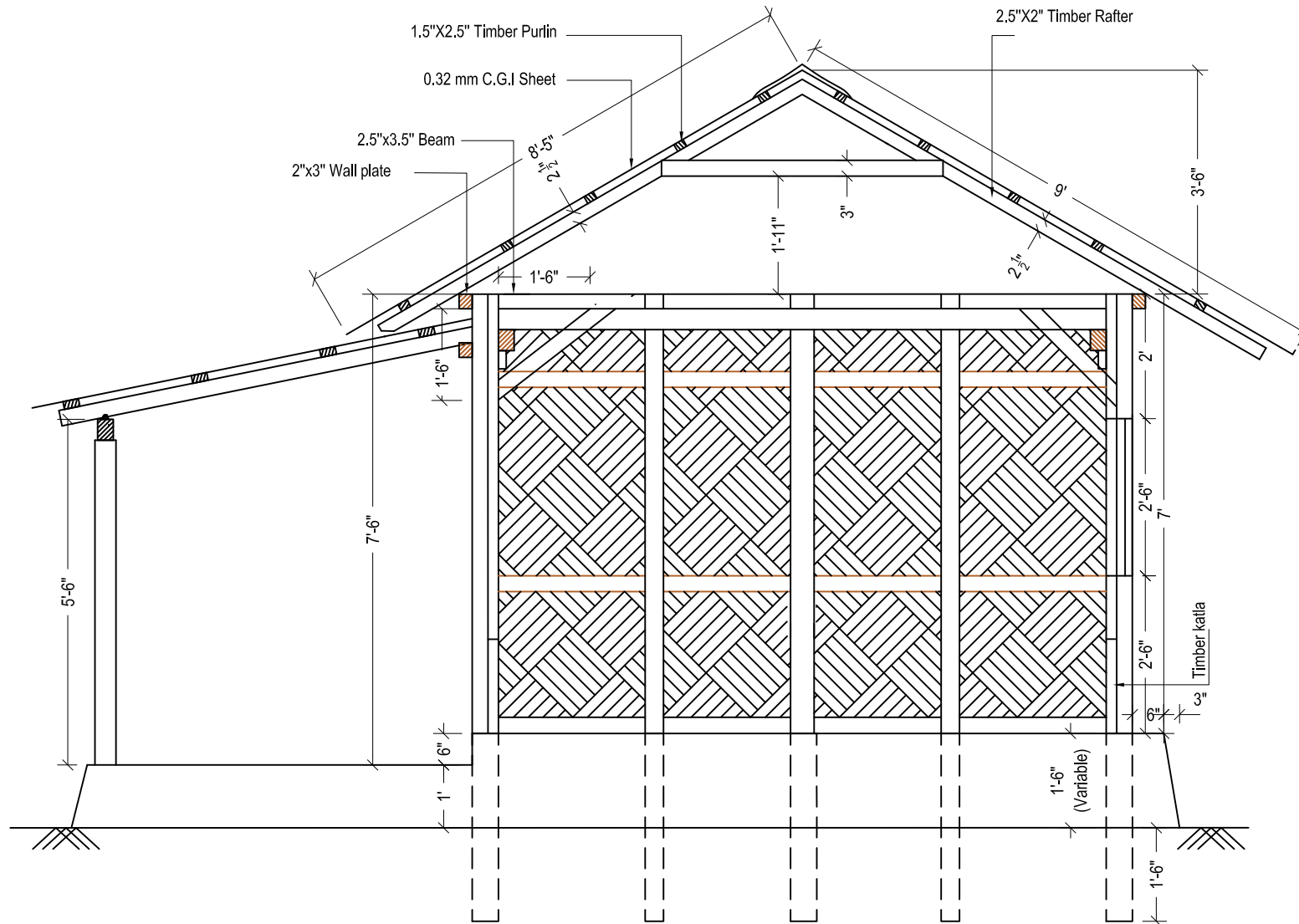
DRAWING TITLE:

PLAN

JULY, 2015

SHEET NO:

S - 01



SECTION: A - A

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: LIMUJHIRI PARA, BANDARBAN

TYPE DP-2 : House on Ground

CONSULTANTS

DEPARTMENT OF  
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BRTC, BUET, DHAKA  
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Grenoble , France

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BANGLADESH

FUNDING AGENCIES



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CARITAS  
LUXEMBOURG

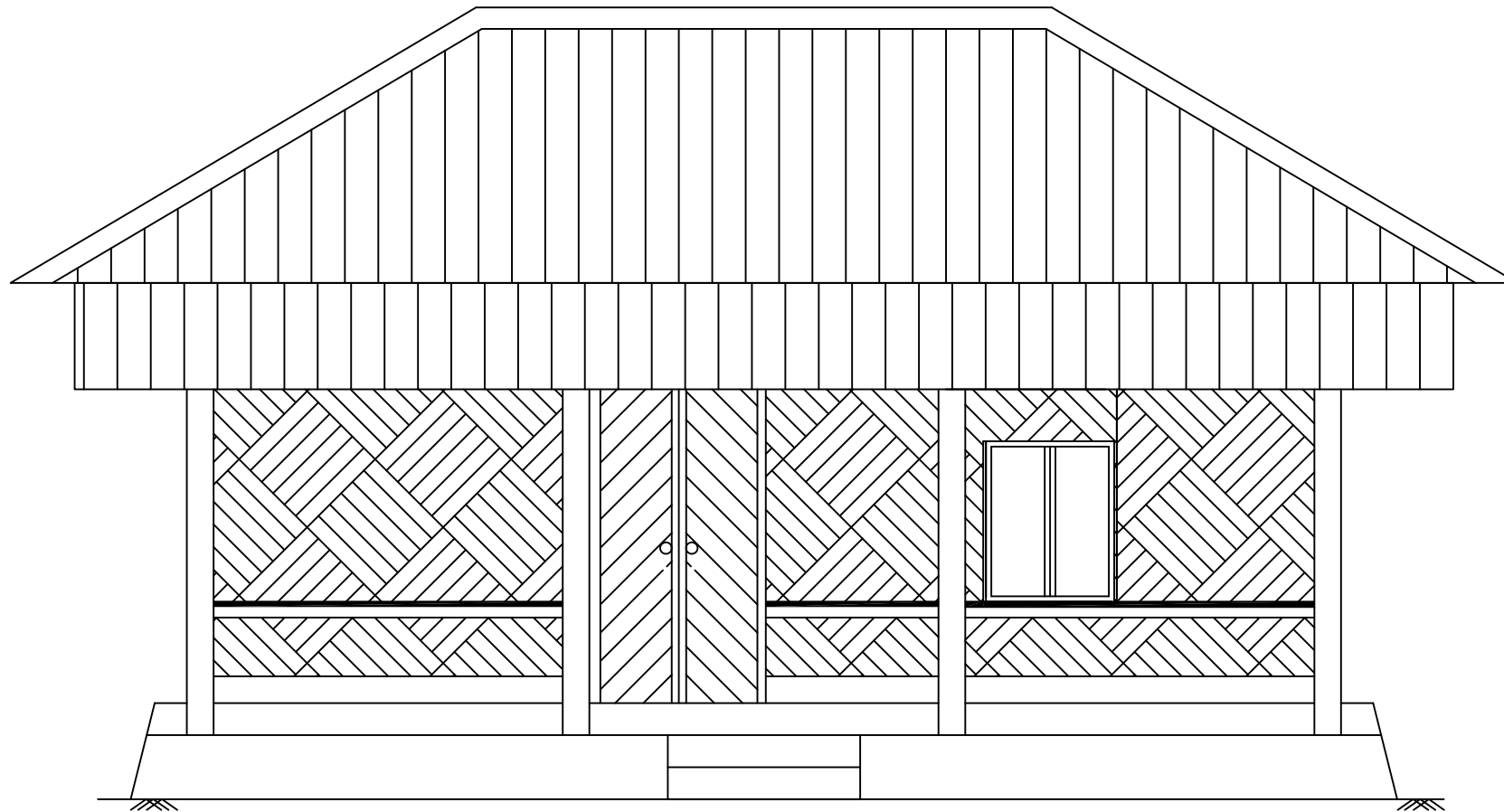
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SECTION: Z-Z

JULY, 2015

SHEET NO:

S - 02



FRONT ELEVATION

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: LIMUJHIRI PARA, BANDARBAN

TYPE DP-2 : House on Ground

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAtterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAtterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

Md. ABU SAYED RASHED

CLIENT

CARITAS  
BANGLADESH

FUNDING AGENCIES



CARITAS FRANCE

CARITAS  
LUXEMBOURG

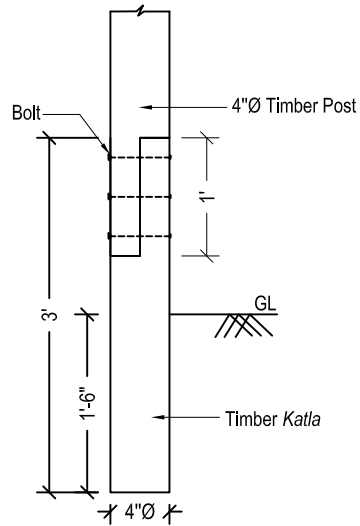
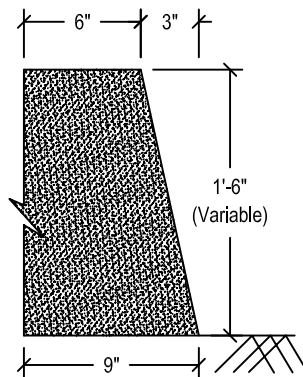
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FRONT ELEVATION

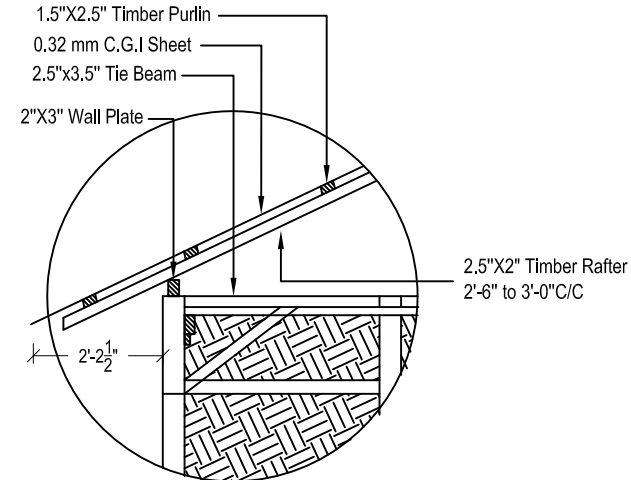
JULY, 2015

SHEET NO:

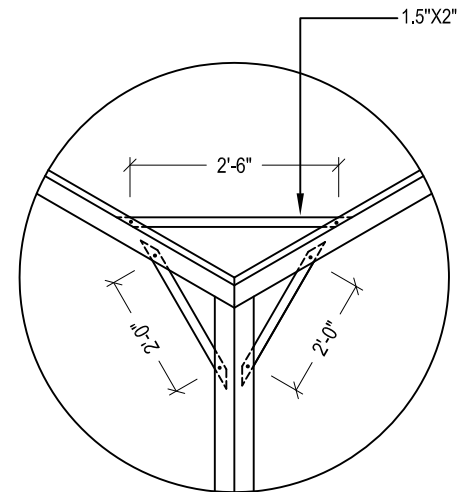
S - 03

Detail 01: Timber *Katla*

Detail 02: Plinth



Detail 03: Corner Bracing and Roof Arrangement



Detail 04: Corner Bracing

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: LIMUJHIRI PARA, BANDARBAN

TYPE DP-2 : House on Ground

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

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2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

Md. ABU SAYED RASHED

CLIENT

CARITAS  
BANGLADESH

FUNDING AGENCIES



CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

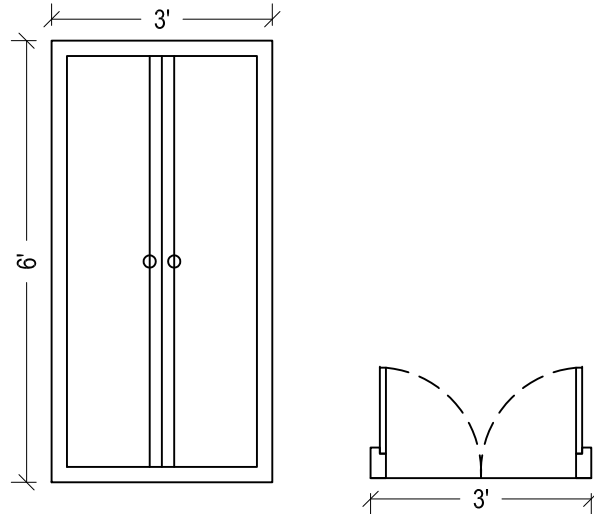
DETAIL

JULY, 2015

SHEET NO:

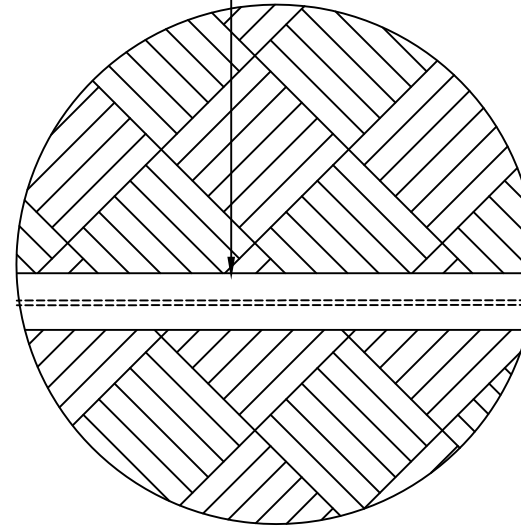
S - 04



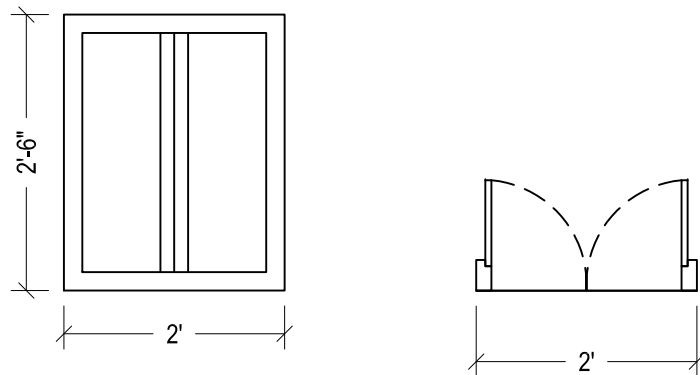


Detail 05: Door

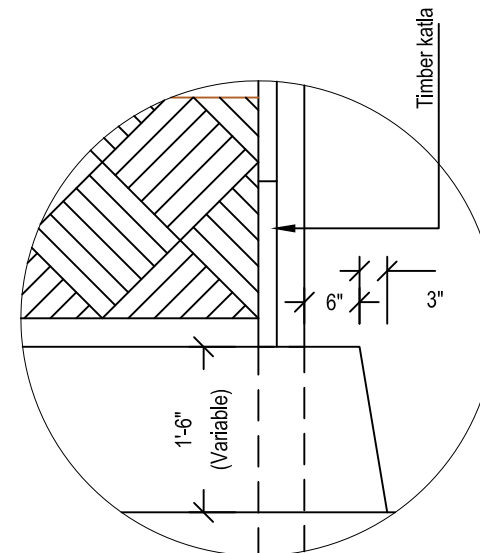
Wooden Tie (3"x1.5")



Detail 07: Double Part Fence Joint



Detail 06: Window

Detail 08: Plinth and *Katla* Arrangement**PROJECT NAME :****CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)**

LOCATION: LIMUJHIRI PARA, BANDARBAN

TYPE DP-2 : House on Ground

**CONSULTANTS**DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France**DESIGN BY:****BUET**

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

**CRAterre**

3. Engr. Olivier Moles

**Caritas, Bangladesh**

1. Mr. Ratan Kumar Podder

**DRAWN BY :**

Md. ABU SAYED RASHED

**CLIENT**CARITAS  
BANGLADESH**FUNDING AGENCIES**

CARITAS FRANCE

CARITAS  
LUXEMBOURG**DRAWING TITLE:**

DETAIL

JULY, 2015

**SHEET NO:****S - 05**

MEMBER SCHEDULE				
SL.	ITEMS NAME	DIMENSIONS	MATERIALS NAME	REMARKS
1.	Timber post	Min Ø 4"	Timber	Round Log, katla at 4-corner.
2.	Bamboo post	Min Ø 3"	Bamboo	
3.	Purlin	1.5"X2.5"	Timber	
4.	Rafter	2.5"X2"	Timber	
5.	Beam	2.5"X3.5"	Timber	
6.	Window	2'-0"x2'-6"	Timber	Position may be changed
7.	Door	3'-0"x6'-0"	Timber	Position may be changed
8.	CGI Sheet (Roof)	Min 0.32 mm	CGI Sheet	
9.	Top tie	1.5"x3"	Timber	
10.	Wall Plate	2"x3"	Timber	

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: LIMUJHIRI PARA, BANDARBAN

TYPE DP-2 : House on Ground

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

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CRAterre

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Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

Md. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

MEMBER SCHEDULE



JULY, 2015

SHEET NO:



S - 06

## DIVISION: DHAKA

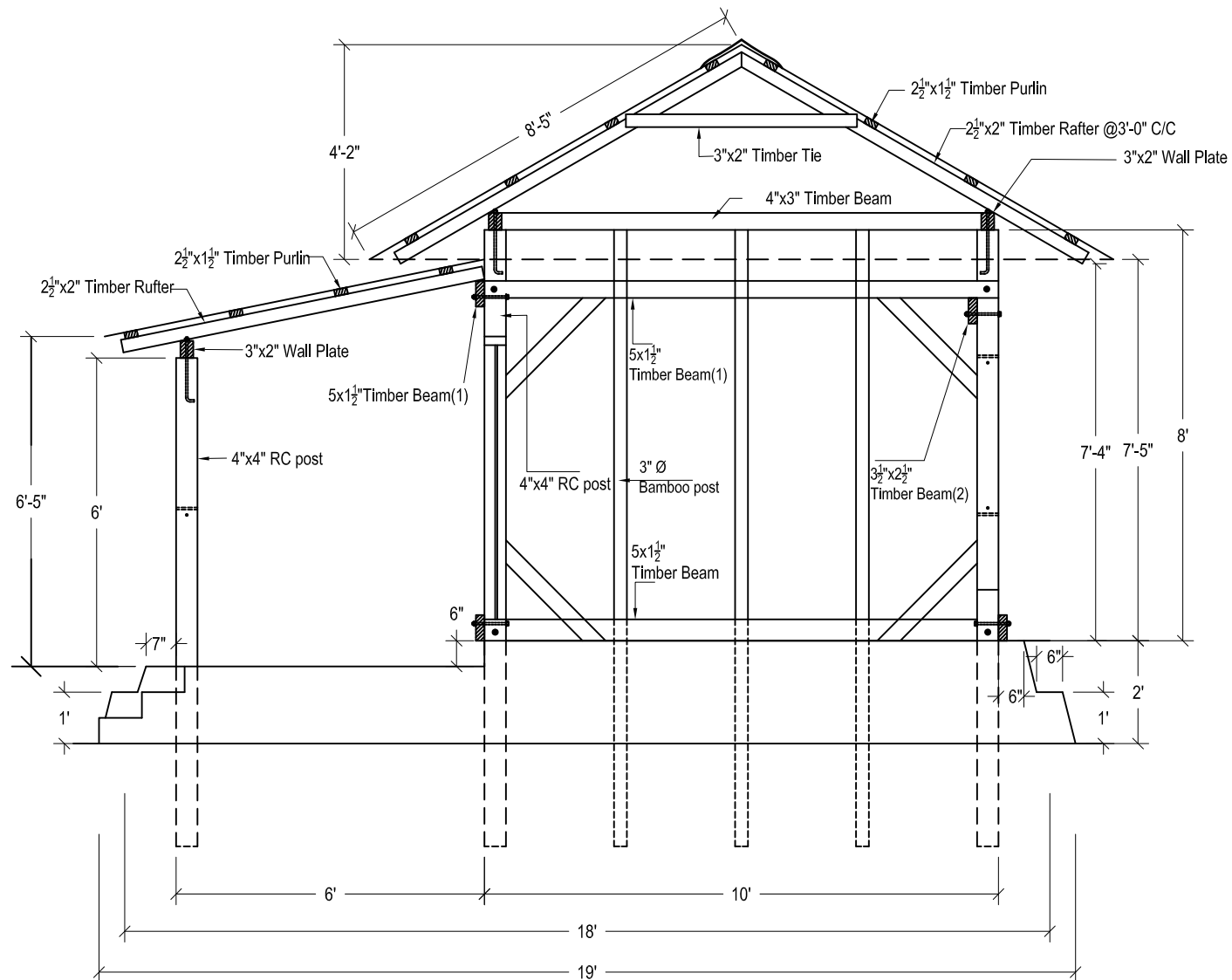
### 13. DESIGN OF LCH IN SIRAJDIKHAN: TYPE – 1

Sirajdikhan	<b>General Information:</b> Location: District: Munshiganj Upazila: Sirajdikhan Union: Lotabdi Mouza/ Village: Kangshapura Climatic Feature: Avg. Maximum Temperature: 40 °C Avg. Minimum temperature: 11.5°C Annual Rainfall: 2121 mm Average Relative Humidity: 66% Geotechnical Feature: Topography: Low land, Flood prone area MSL: 5 m Soil Characteristics: Silt Disaster: Flood and Northwester	 <b>Completed House</b>
	<b>SITE TOPOGRAPHY</b> 	<b>Design Considerations:</b> Available Building Materials: Mud, Bamboo, RC post, GI wire, CGI sheets, Straw, Wood etc Foundation: Wooden/ Bamboo posts embedded in soil (1-2 ft) Plinth: Mud Post: RC pillar and bamboo post Fence/Wall: Bamboo mat (2 parts) Openings: 1 main door + 1 inside door to connect rooms Ceiling: Ceiling is considered to protect heat and cold Treatment (bamboo & wood): Water treatment & partial chemical treatment Roof Type: Four pitched & veranda roof is disconnected from main roof Roof cover: CGI sheet Roof structure: Wooden truss Bracing: Corner bracing Cost: Tk. 63,000

A

-  ← 4" RC post  
 ← 3"Ø Bamboo post

S - 01



SECTION : A - A

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: SIRAJDIKHAN, MUNSHIGONJ

TYPE 1 : C.G.I. Sheet with Bamboo Fence

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRATERre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRATERre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

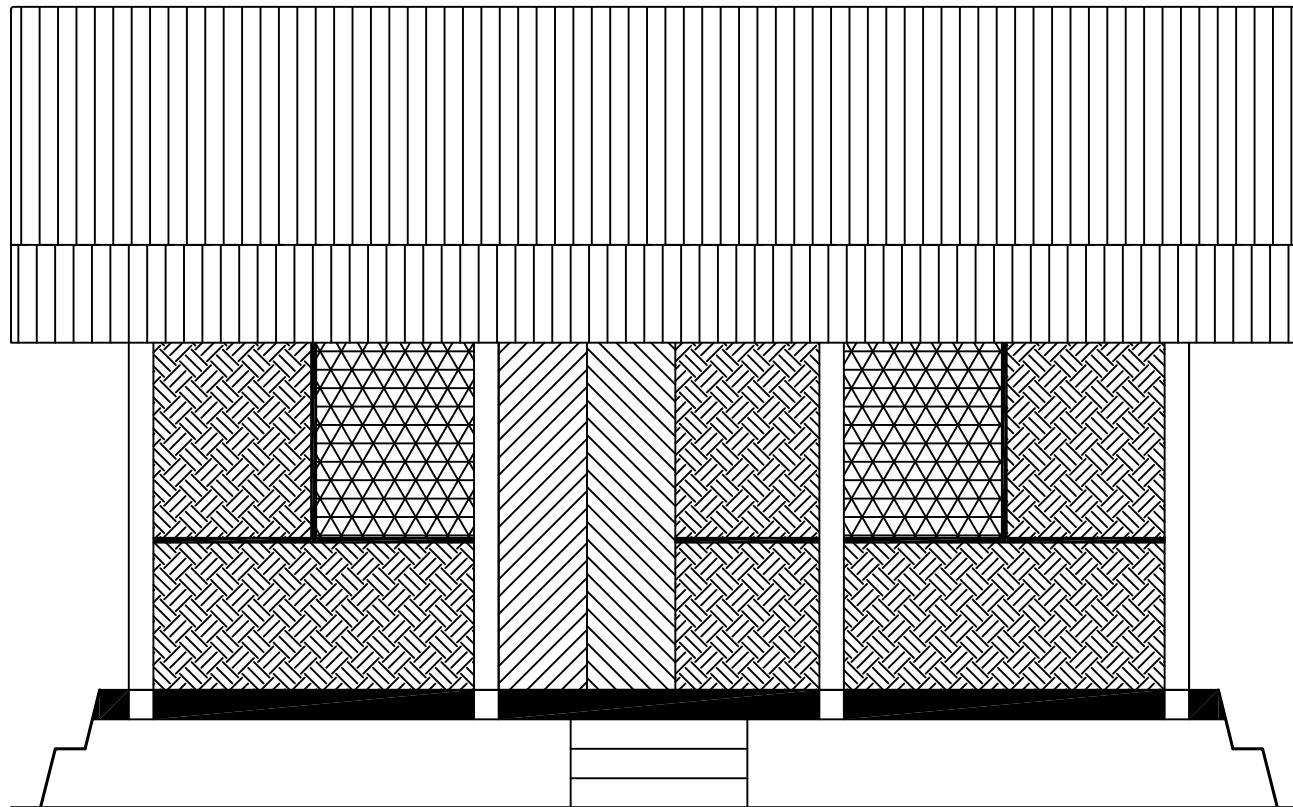
DRAWING TITLE:

SECTION- A - A

JULY, 2015

SHEET NO:

S - 02



FRONT ELEVATION

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: SIRAJDIKHAN, MUNSHIGONJ

TYPE 1 : C.G.I. Sheet with Bamboo Fence

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

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CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

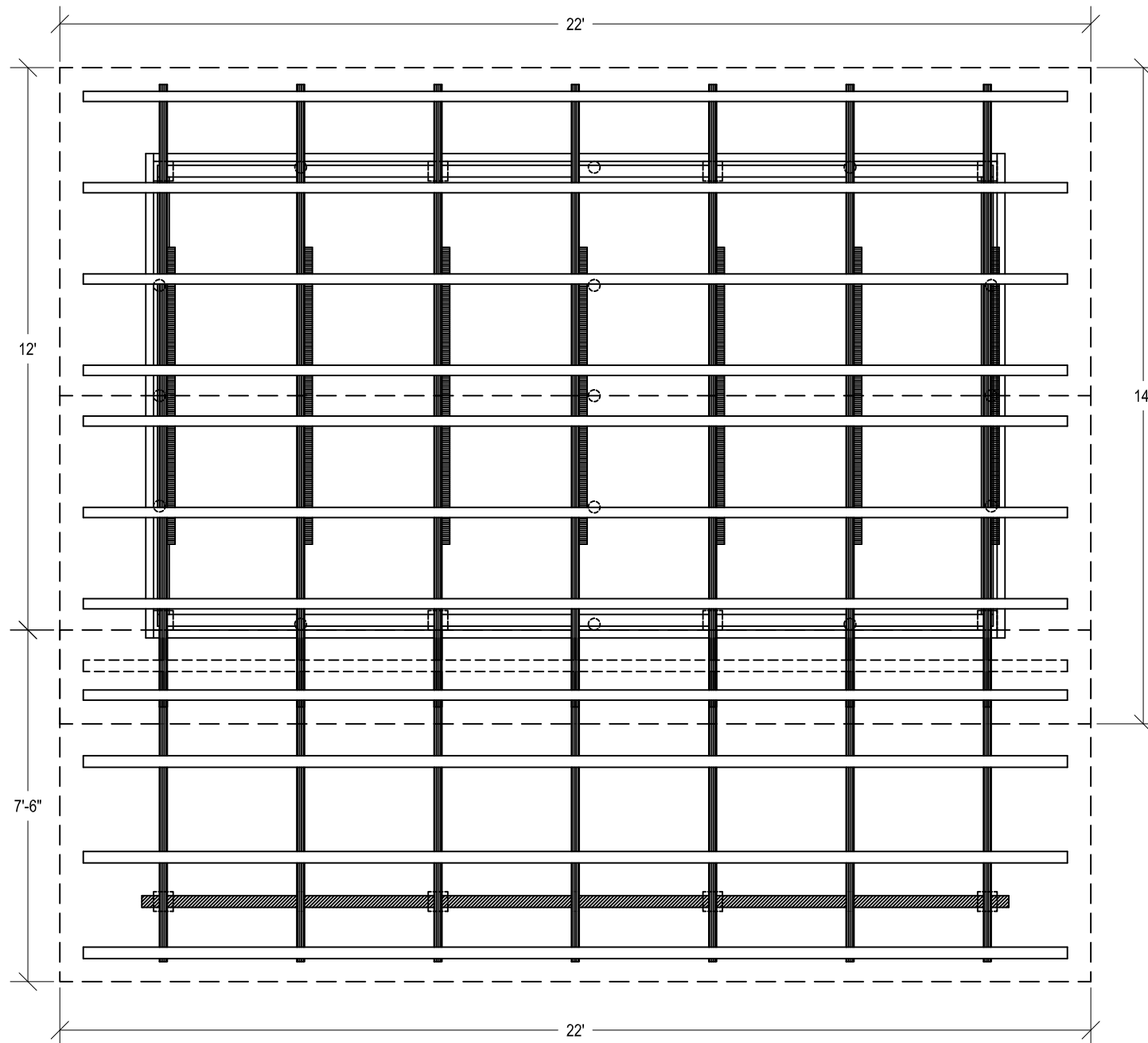
DRAWING TITLE:

FRONT ELEVATION

JULY, 2015

SHEET NO:

S - 03



PLAN OF ROOF TURSS SYSTEM

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: SIRAJDIKHAN, MUNSHIGONJ

TYPE 1 : C.G.I. Sheet with Bamboo Fence

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRATERRE  
Grenoble , France

DESIGN BY:

BUET

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2. Prof. Dr. Mohammad Shariful Islam

CRATERRE

3. Engr. Olivier Moles

CARITAS, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

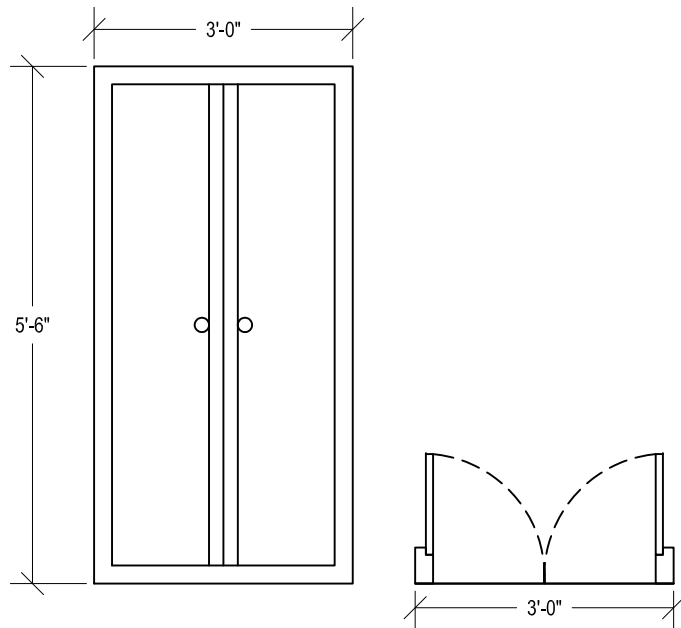
PLAN OF TURSS SYSTEM

JULY, 2015

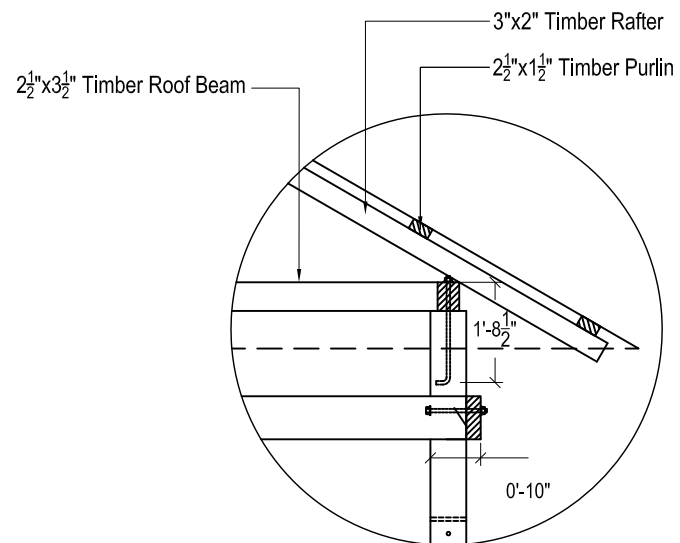
SHEET NO:

S - 04

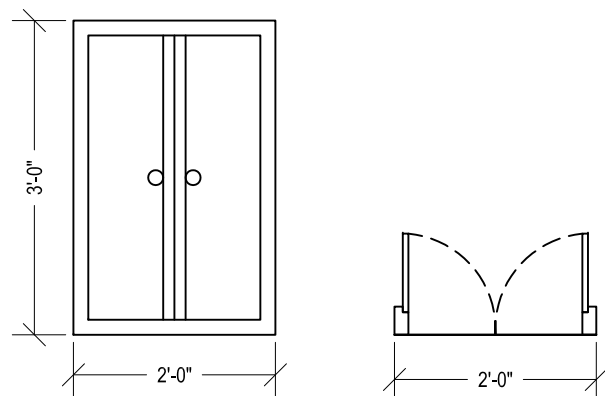




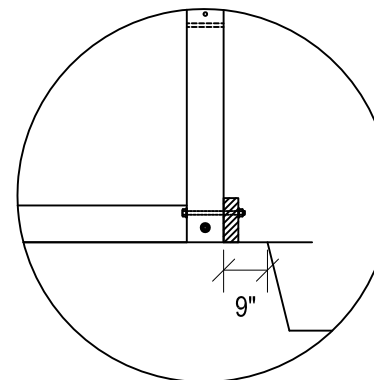
Detail 01: Door



Detail 03: Corner Bracing and Roof Arrangement



Detail 02: Window



Detail 04: Katla Joint

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: SIRAJDIKHAN, MUNSHIGONJ

TYPE 1 : C.G.I. Sheet with Bamboo Fence

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAtterre  
Grenoble , France

DESIGN BY:

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CRAtterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

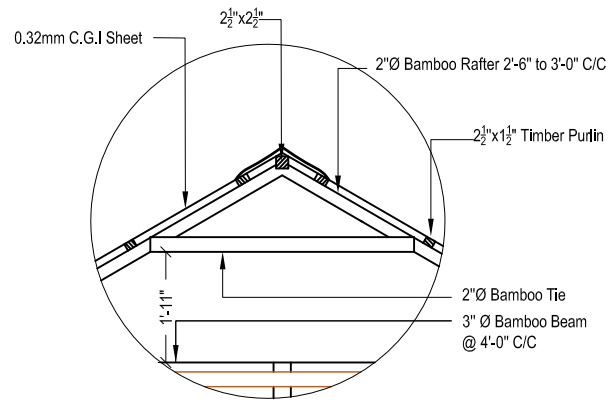
DRAWING TITLE:

DETAIL

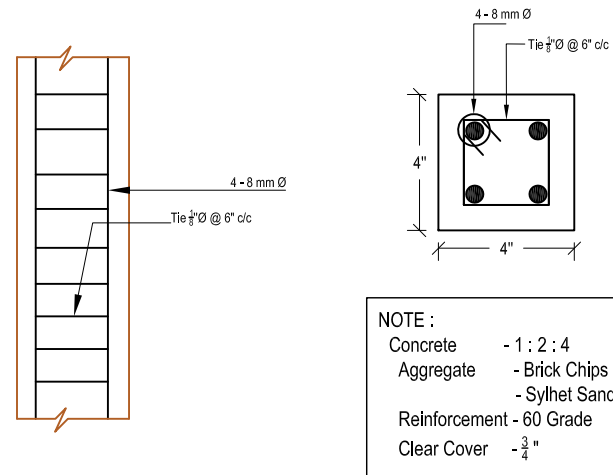
JULY, 2015

SHEET NO:

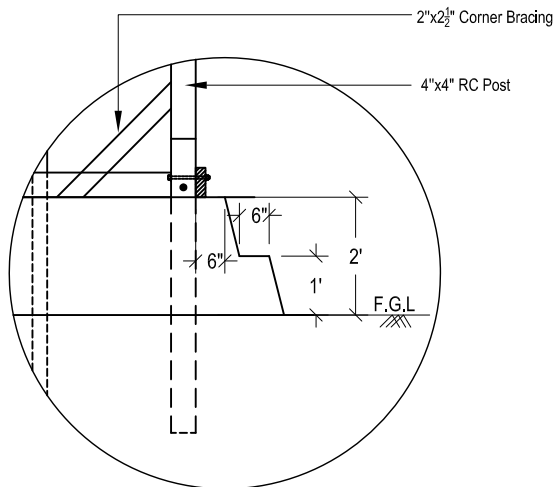
S - 05



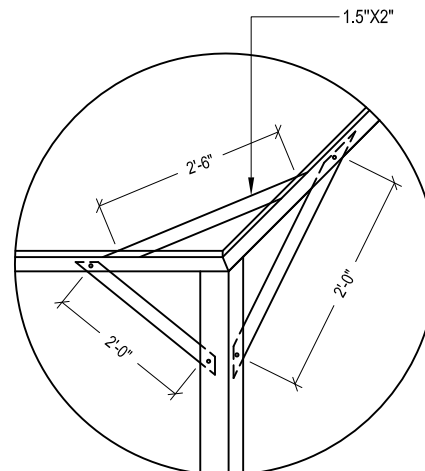
Detail 05: Roof Top



Detail 07: RC Post (Long Section &amp; Cross Section)



Detail 06: Plinth



Detail 08: Corner Bracing

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: SIRAJDIKHAN, MUNSHIGONJ

TYPE 1 : C.G.I. Sheet with Bamboo Fence

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRATERRE  
Grenoble , France

DESIGN BY:

BUET

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2. Prof. Dr. Mohammad Shariful Islam

CRATERRE

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

DETAIL

JULY, 2015

SHEET NO:

S - 06

MEMBER SCHEDULE				
SL.	ITEMS NAME	DIMENSIONS	MATERIALS NAME	REMARKS
1.	Roof Cover	0.36mm	CGI Sheet	
2.	Purlin	2.5"X1.5"	Timber	
3.	Rafter	2.5"X2"	Timber	3'-0" C/C
4.	Tie	3"X2"	Timber	3'-0" C/C
5.	Roof beam	4"x3"	Timber	
6.	Timber beam(1)	5"x1.5"	Timber	
7.	Timber beam (2)	3.5"x2.5"	Timber	
8.	Wall Plate	3"x2"	Timber	
9.	Fance	0.22mm	CGI Sheet	
10.	Main Post	4"x4"x11'	RC	4-8mmØ 1:2:4 Concrete
11.	Door	3'x5'-6"	Timber	Position may be changed
12.	Window	3"x2"	Timber	Position may be changed

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: SIRAJDIKHAN, MUNSHIGONJ

TYPE 1 : C.G.I. Sheet with Bamboo Fence

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

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CRAAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXENBOURG

DRAWING TITLE:

MEMBER SCHEDULE

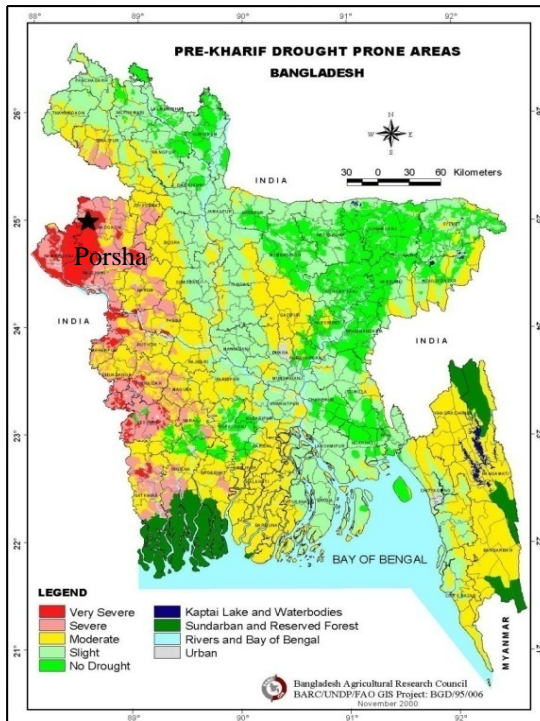
JULY, 2015

SHEET NO:

S - 07

## DIVISION: RAJSHAHI

### 14. DESIGN OF LCH IN PORSHA: TYPE – 1



#### SITE TOPOGRAPHY



#### General Information:

##### Location:

District: Naogoan

Upazila: Porsha

Union: Chawar

Mouza/ Village: Hiradanga and Uchadanga

##### Climatic Feature: Dry and cold

Avg. Maximum Temperature: 45 °C

Avg. Minimum temperature: 7°C

Annual Rainfall: 1862 mm

Average Relative Humidity: 74%

##### Geotechnical Feature:

Topography: Uneven land

MSL: 31 m

Soil Characteristics: Silt

##### Disaster:

Drought, cold wave, earthquake, storm



Completed House

#### Design Considerations:

Available Building Materials: Mud, Bamboo, Timber, *Binna* grass etc

Foundation: Mud

Plinth: Mud (two/three steps)

Post: RC and bamboo posts with *katla*/without *katla*

Fence/Wall: Mud

Openings: 1 main door + 1 inside door to connect rooms

Ceiling: Ceiling is considered to protect heat & cold & as storage

Rain water harvesting system

Roof Type: Four pitched & veranda  
roof is disconnected from main roof

Roof cover: CGI sheets

Roof structure: Wooden truss

Bracing: Corner bracing

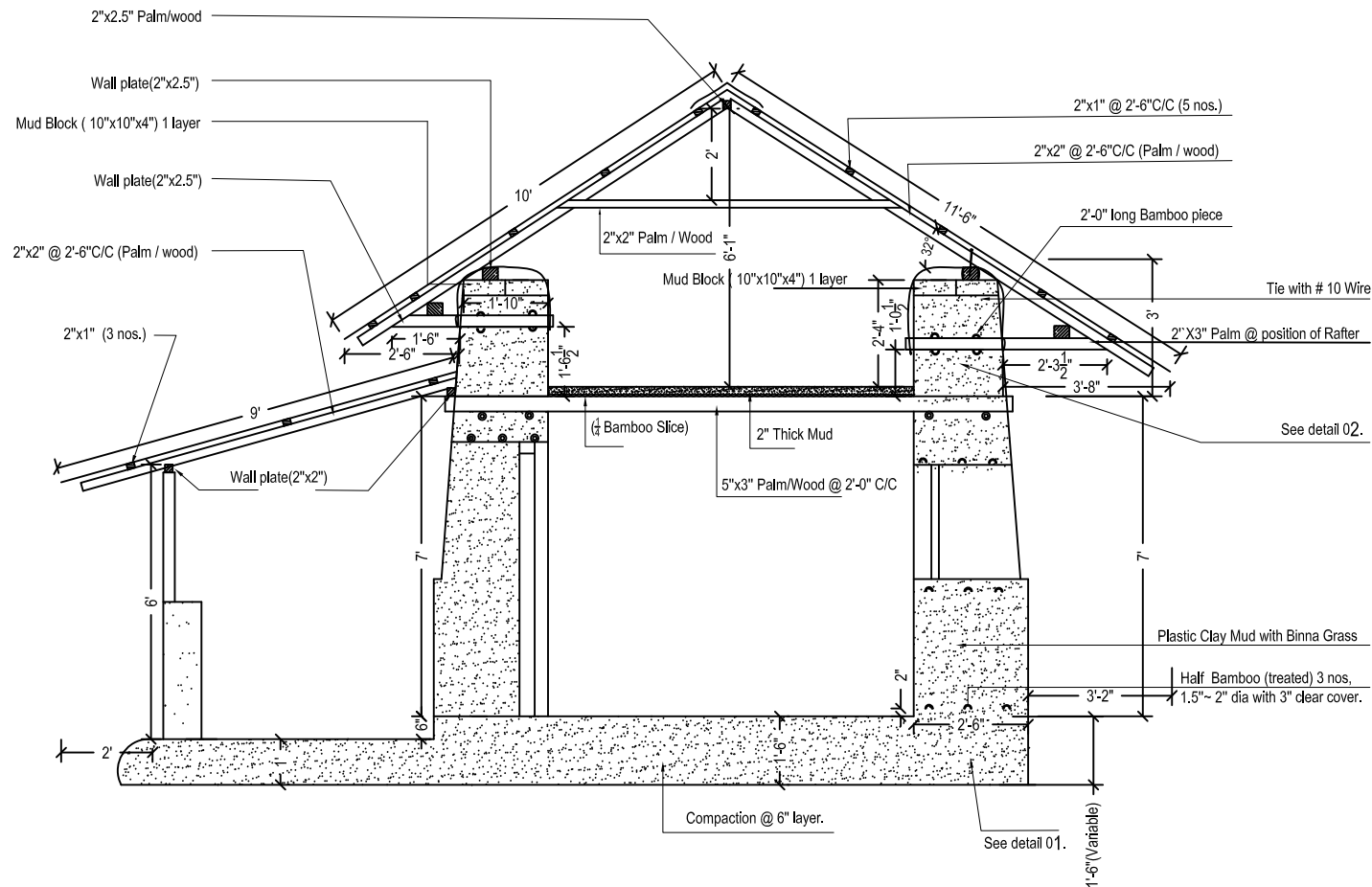
Joints: Nails, notches, GI wire

Cost: Tk. 90,000

S - 01

\* Fire brick > Exposed to rainfall surface.

## PLAN



SECTION: A - A

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: PORSHA, NAOGAON

TYPE 1 : MUD WALL HOUSE

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

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2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

MD. ABU SAYED RASHED

CLIENT

CARITAS  
BANGLADESH

FUNDING AGENCIES



CARITAS FRANCE

CARITAS  
LUXEMBOURG

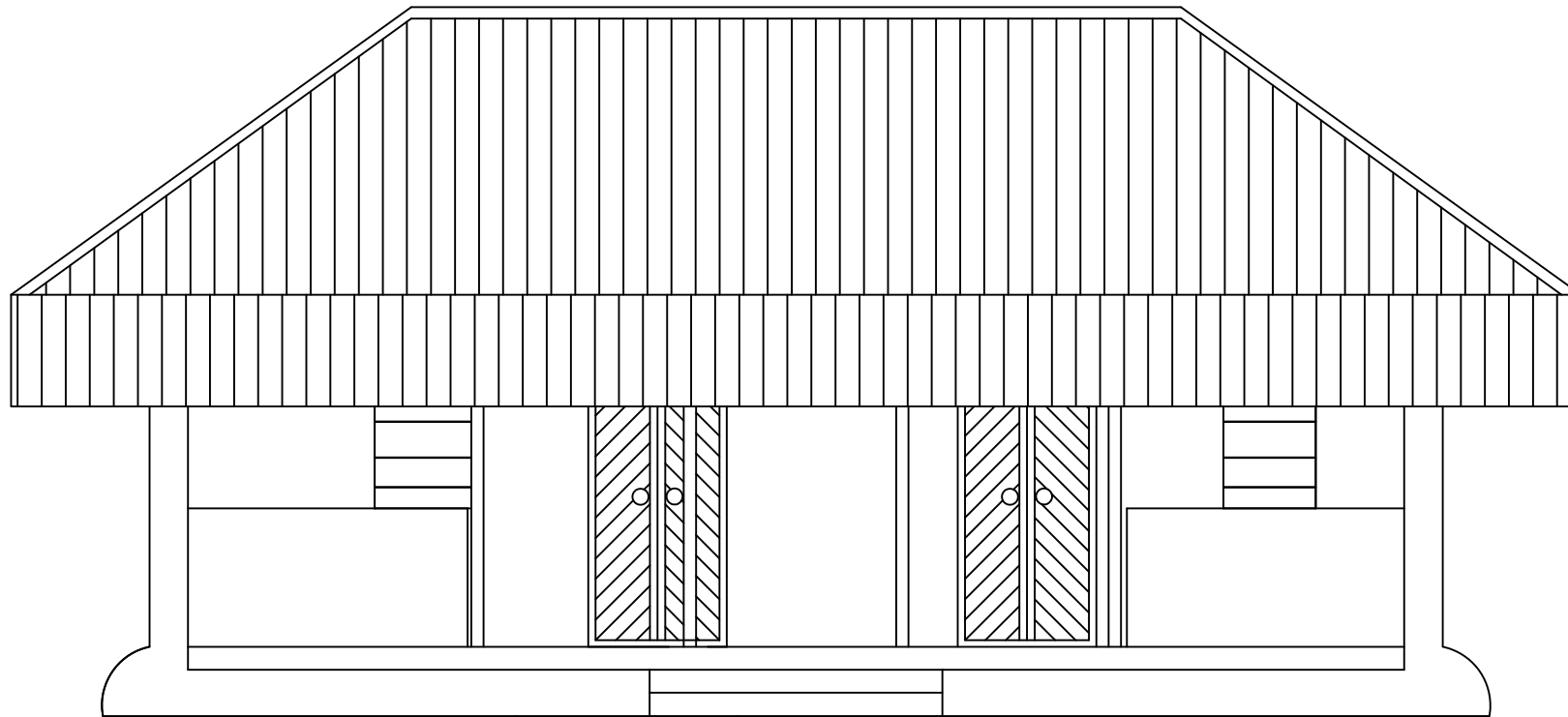
DRAWING TITLE:

SECTION: A-A

JULY, 2015

SHEET NO:

S - 02



FRONT ELEVATION

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: PORSHA, NAOGAON

TYPE 1 : MUD WALL HOUSE

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

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CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

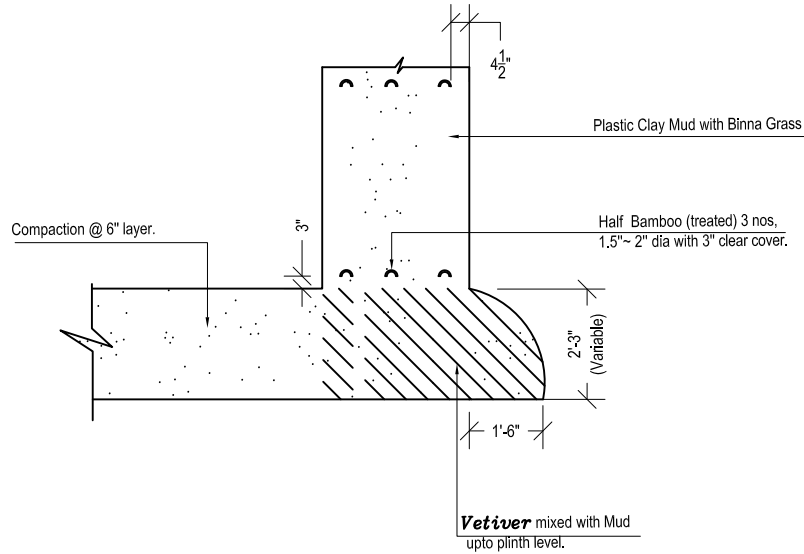
FRONT ELEVATION

JULY, 2015

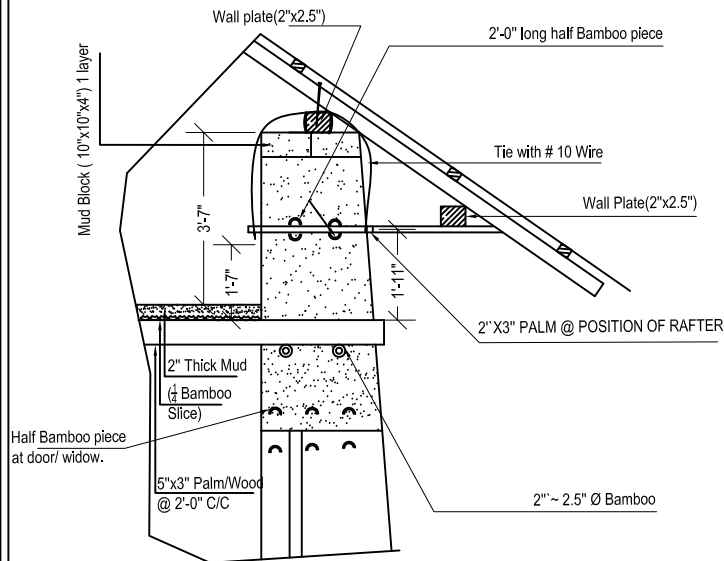
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S - 03

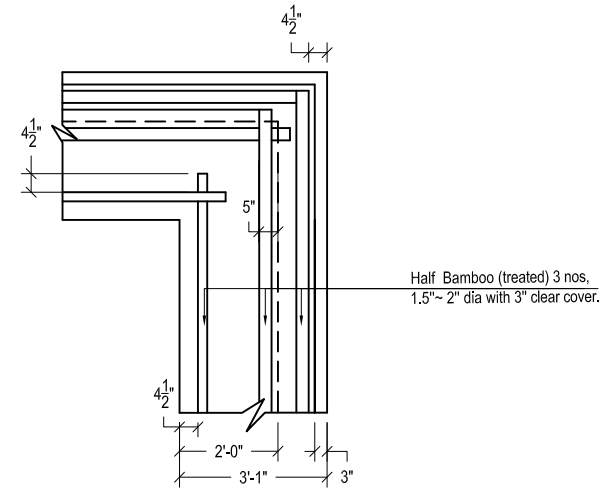




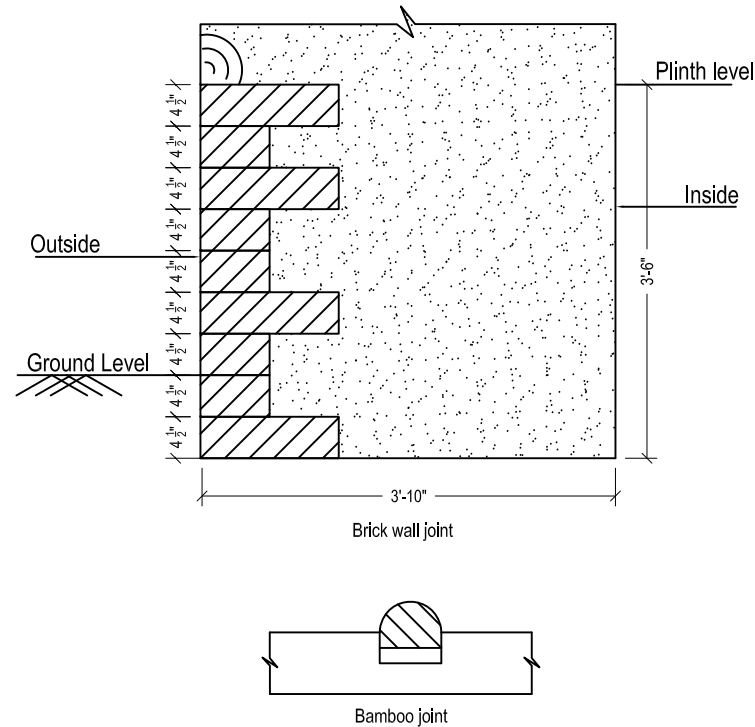
Detail 01: Plinth Protection



Detail 02: Roof Connection



Detail 03 : Corner Strengthening with Bamboo



Detail 04 : Bamboo Joint/ Brick Wall Joint

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: PORSHA, NAOGAON

TYPE 1 : MUD WALL HOUSE

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRATERRE  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRATERRE  
3. Engr. Olivier MolesCARITAS, Bangladesh  
1. Mr. Ratan Kumar Podder

DRAWN BY :

MD. ABU SAYED RASHED

CLIENT

CARITAS  
BANGLADESH

FUNDING AGENCIES



CARITAS FRANCE

CARITAS  
LUXEMBOURG

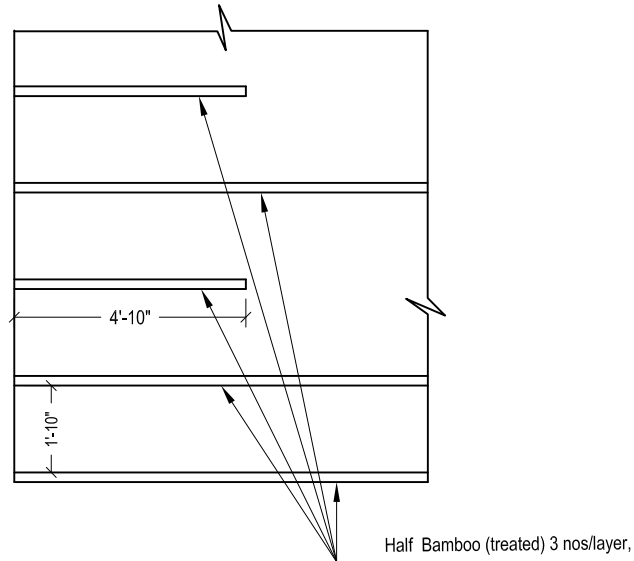
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DETAILS

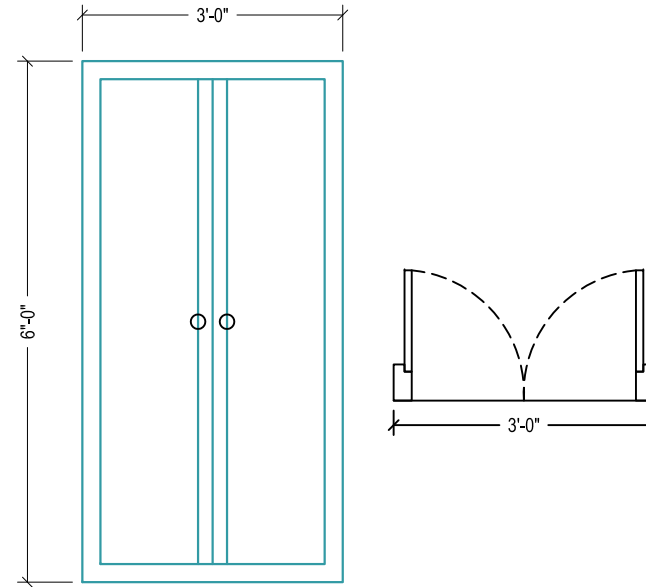
JULY, 2015

SHEET NO:

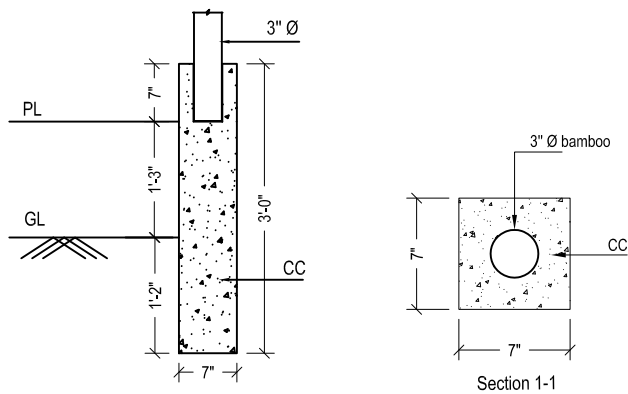
S - 04



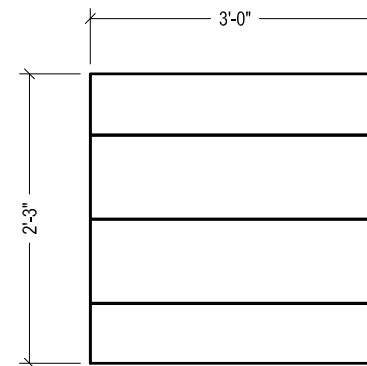
Detail 05: Corner Elevation



Detail 07: Door



Detail 06: Katla



Detail 08: Window

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: PORSHA, NAOGAON

TYPE 1 : MUD WALL HOUSE

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre  
3. Engr. Olivier MolesCaritas, Bangladesh  
1. Mr. Ratan Kumar Podder

DRAWN BY :

MD. ABU SAYED RASHED

CLIENT

CARITAS  
BANGLADESH

FUNDING AGENCIES



CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

DETAILS

JULY, 2015

SHEET NO:

S - 05

MEMBER SCHEDULE				
SL.	ITEMS NAME	DIMENSIONS	MATERIALS NAME	REMARKS
1.	Roof Cover	0.36 mm	CGI Sheet	
2.	Purlin	2"x1"	Timber	@ 2'-6" C/C
3.	Rafter	2"x2"	Plam/wood	@ 2'-6" C/C
4.	Tie Beam (upper	2"x2"	Plam/wood	@ 2'-6" C/C
5.	Roof Beam	5"x3"	Plam/wood	@ 2'-0" C/C
6.	Wall Plate (Main house)	2"x2.5"	Timber	
8.	Wall Plate (Veranda)	2"x2"	Timber	
9.	Mud Wall	2'-6" thick at bottom	Plastic Clay with Vetiver	
10.	Mud Wall	1'-10" thick at top	Plastic Clay with Vetiver	
11.	Mud Block	10"x10"x4"	Plastic Clay	One Layer over Mud wall
12.	Post (Veranda)	3" dia	Bamboo	
13.	Door	3'x6'	Mud	Position may be Changed
14.	Windowt	2'-3"x3"-0"	Mud	Position may be Changed

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: PORSHA, NAOGAON

TYPE 1 : MUD WALL HOUSE

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain  
2. Prof. Dr. Mohammad Shariful Islam

CRAAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXENBOURG

DRAWING TITLE:

MEMBER SCHEDULE

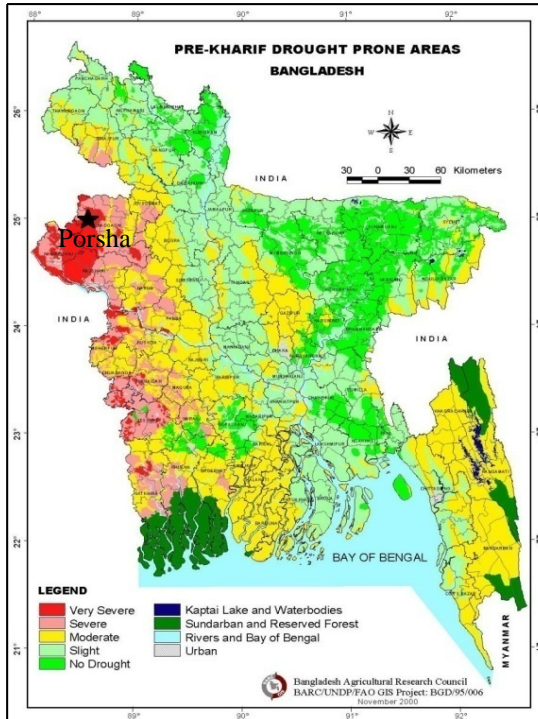
JULY, 2015

SHEET NO:

S - 06

## DIVISION: RAJSHAHI

### 15. DESIGN OF LCH IN PORSHA: TYPE – 2.1



#### SITE TOPOGRAPHY



#### General Information:

##### Location:

District: Naogoan

Upazila: Porsha

Union: Chawer

Mouza/ Village: Banshparaa

##### Climatic Feature: Dry and cold

Avg. Maximum Temperature: 38 °C

Avg. Minimum temperature: 12°C

Annual Rainfall: 1862 mm

Average Relative Humidity: 74%

##### Geotechnical Feature:

Topography: Uneven land

MSL: 31 m

Soil Characteristics: Silt

##### Disaster:

Drought, cold wave, earthquake, storm



Completed House

#### Design Considerations:

Available Building Materials: Mud, Bamboo, Timber, *Binna* grass etc

Foundation: Mud

Plinth: Mud

Post: RC and bamboo posts with *katla*/without *katla*

Fence/Wall: Mud

Openings: 1 main door + 1 inside door to connect rooms

Ceiling: Ceiling is considered to protect heat and cold

Rain water harvesting system

Roof Type: Four pitched

Roof cover: CGI sheets

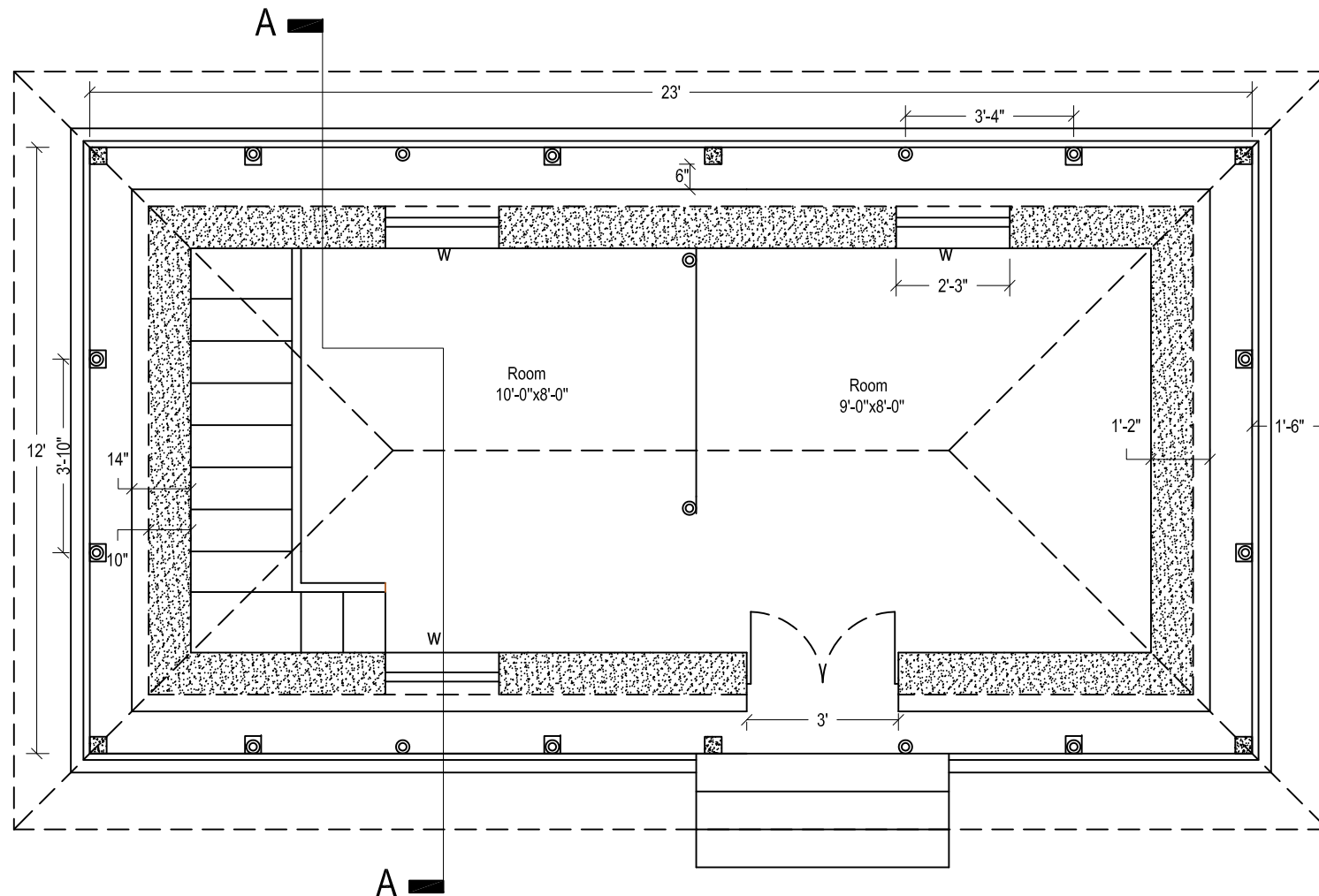
Roof structure: Wooden/ bamboo truss

Bracing: Corner bracing




Joints: Nails, notches, GI wire






Cost: Tk. 80,000

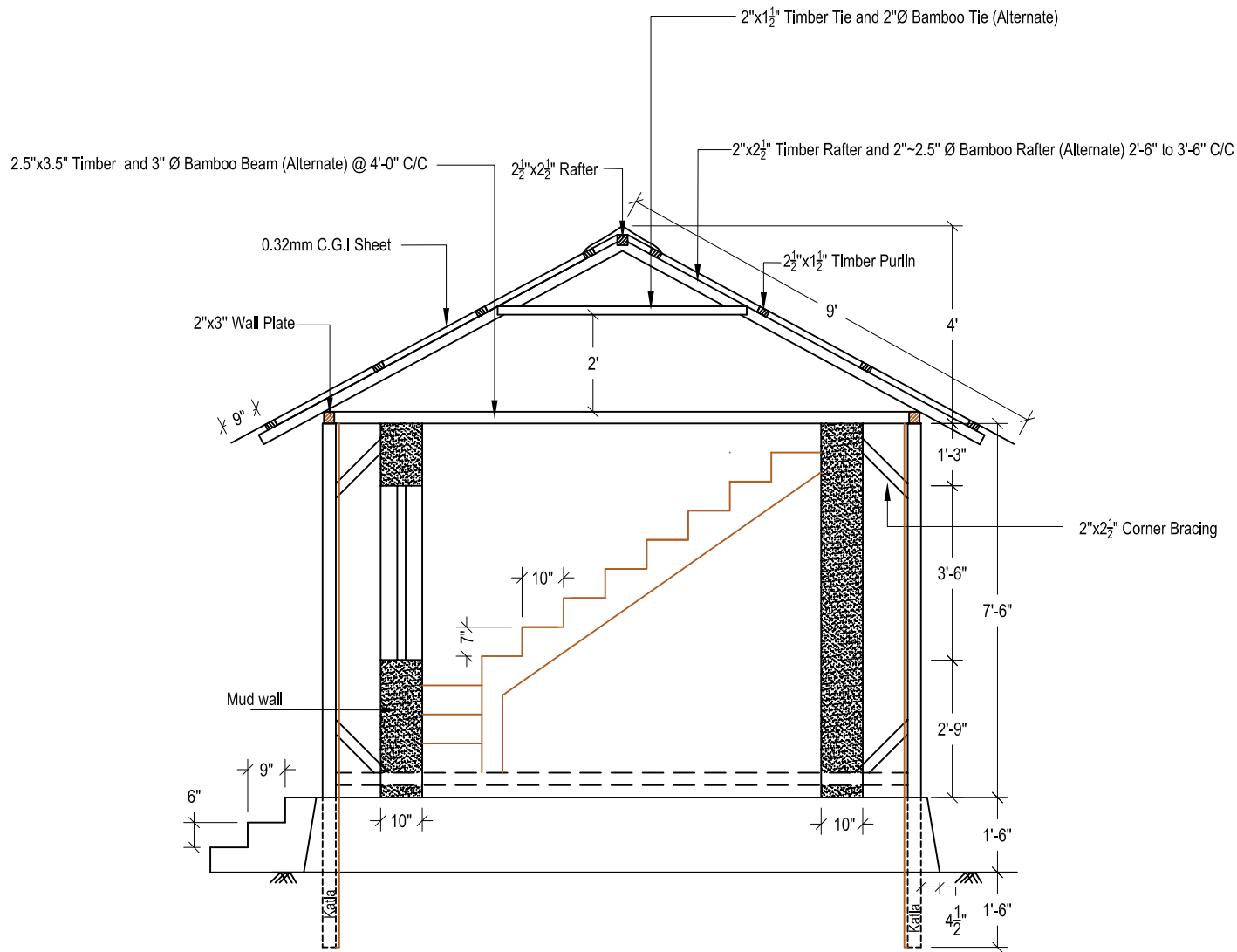
D105



PLAN

-  RC Post 4"x4"
-  Bamboo post
-  Bamboo post With Katla

PROJECT NAME :	
CONSTRUCTION OF PILOT LOW COST HOUSES (LCH)	
LOCATION: PORSHA, NAOGAON	
TYPE DP 2 : MUD WALL	
CONSULTANTS	
 DEPARTMENT OF CIVIL ENGINEERING BRTC, BUET, DHAKA BANGLADESH	 ENSAG-CRATERRE Grenoble, France
DESIGN BY:	
BUET 1. Prof. Dr. Tahsin Reza Hossain 2. Prof. Dr. Mohammad Shariful Islam  CRATERRE 3. Engr. Olivier Moles  Caritas, Bangladesh 1. Mr. Ratan Kumar Podder	
DRAWN BY :	
MD. ABU SAYED RASHED	
CLIENT	FUNDING AGENCIES
 CARITAS BANGLADESH	 CARITAS FRANCE   CARITAS LUXEMBOURG
DRAWING TITLE:	
PLAN	
JULY, 2015	SHEET NO: S - 01



SECTION: A - A

PROJECT NAME :

### CONSTRUCTION OF PILOT LOW COST HOUSES (LCH)

LOCATION: PORSHA, NAOGAON

TYPE DP 2: MUD WALL

CONSULTANTS



DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESH

ENSAG-CRAterre  
G, Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

- ### 3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES
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CARITAS FRANCE

CARITAS  
BANGLADESH



CARITAS  
LUXEMBOURG

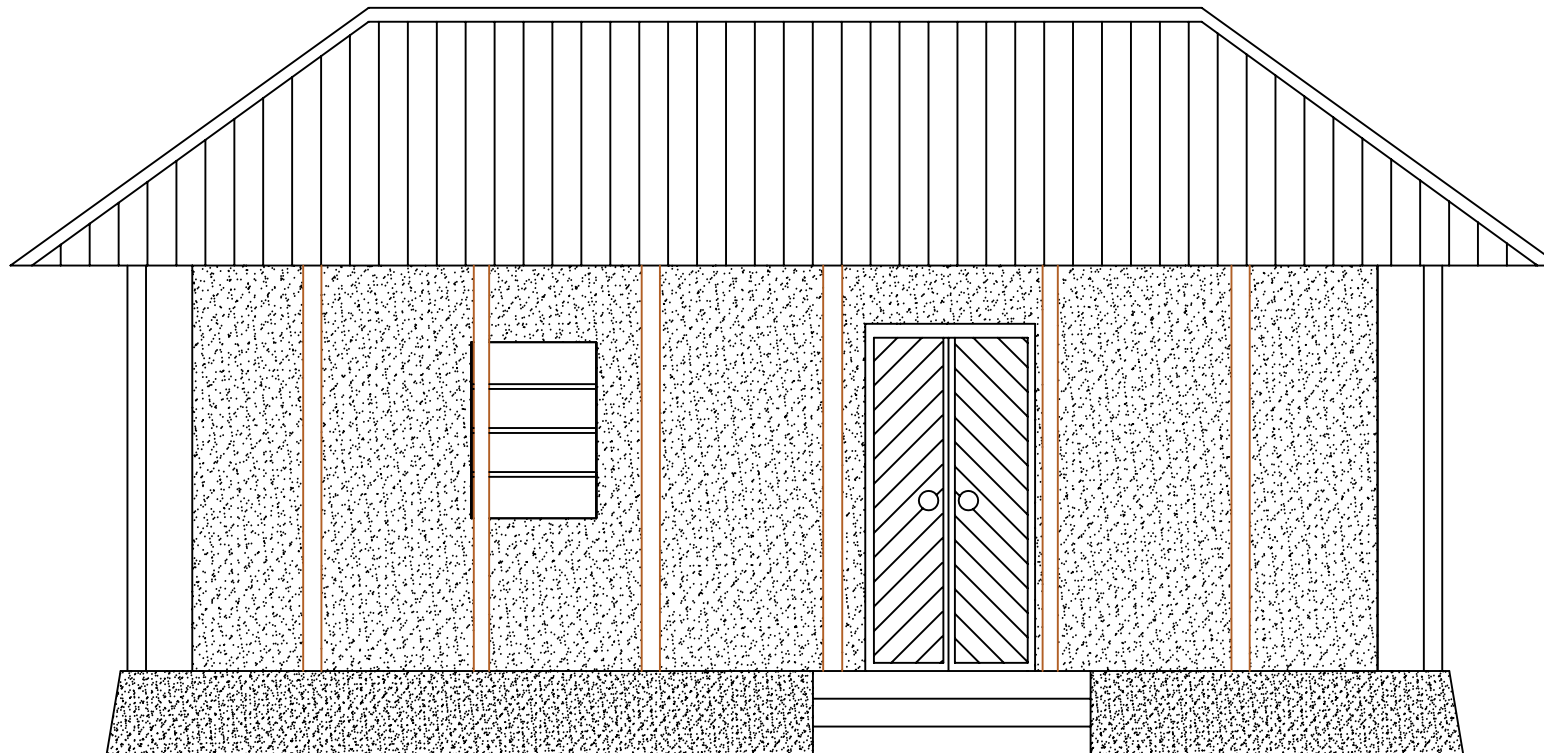
DRAWING TITLE:

SECTION A - A

JULY, 2015

SHEET NO:

S - 02



FRONT ELEVATION

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: PORSHA, NAOGAON

TYPE DP 2 : MUD WALL

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

FRONT ELEVATION

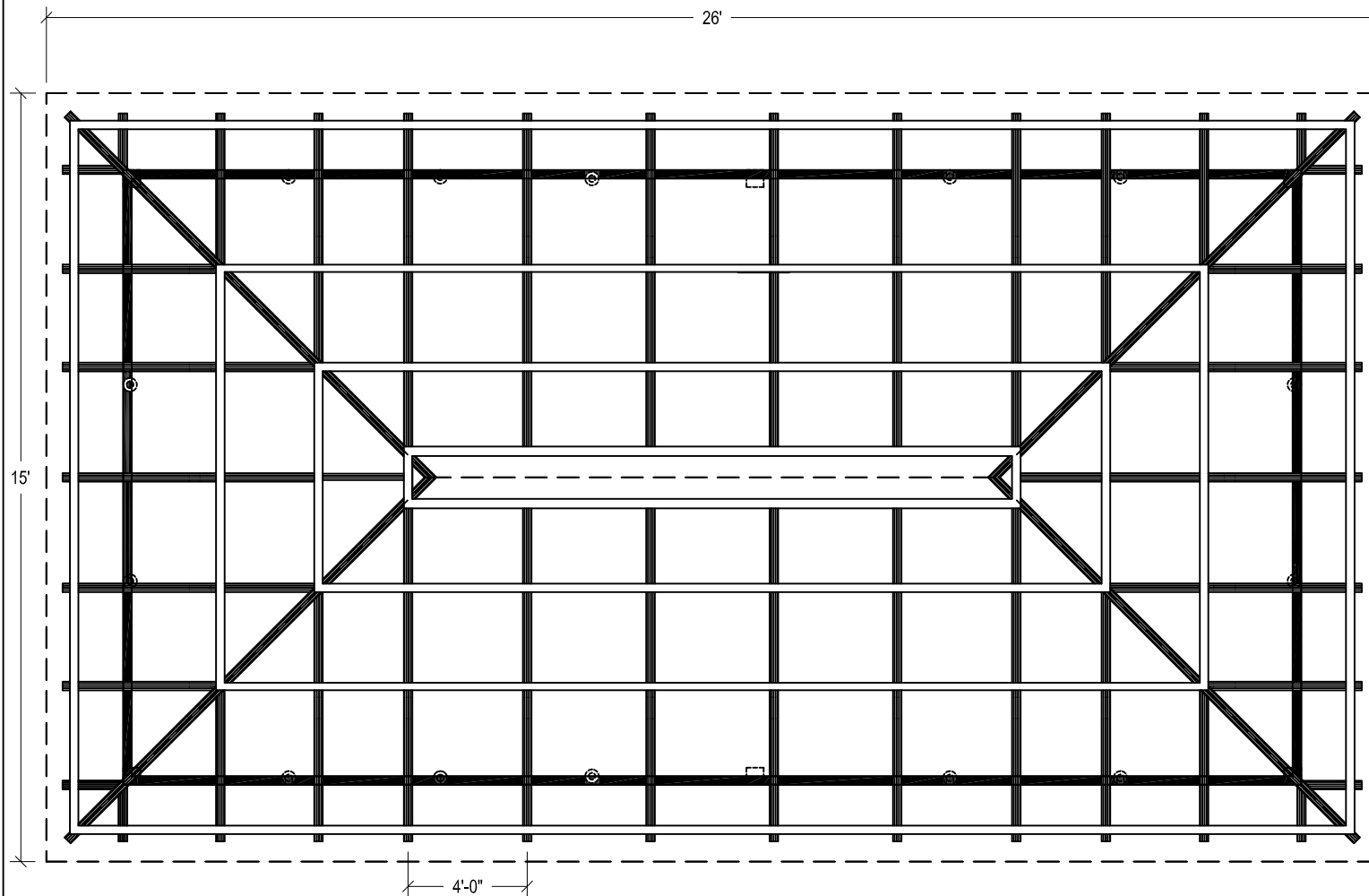
JULY, 2015

SHEET NO:

S - 03



D108



PLAN OF ROOF TRUSS SYSTEM

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: PORSHA, NAOGAON

TYPE DP 2 : MUD WALL

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE: Mud Wall House (Type-2.1)

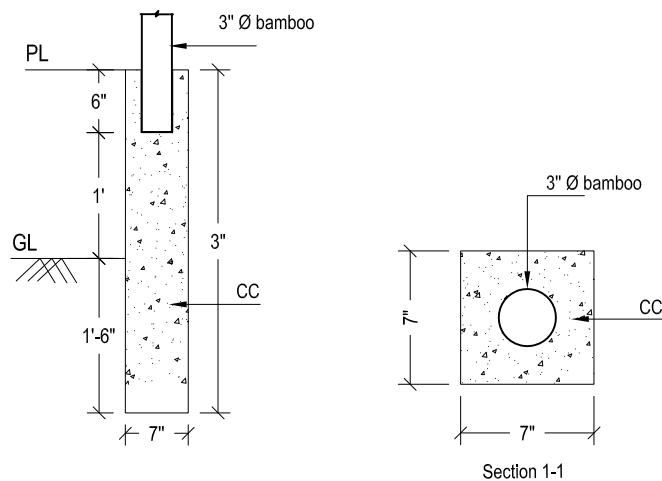
PLAN OF TRUSS SYSTEM

JULY, 2015

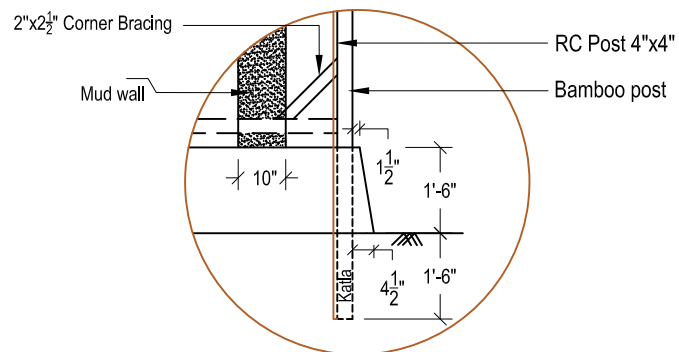
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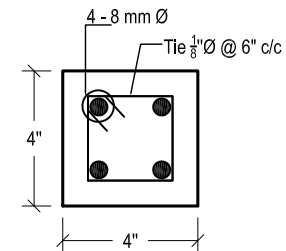




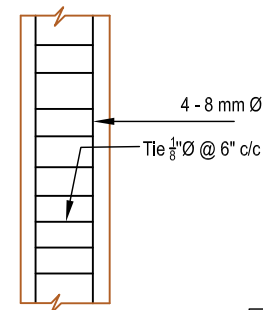
Detail 01: Bamboo into C C Katla



Detail 02: Plinth



Detail 03: RC Post (Cross Section)



**NOTE :**

Concrete - 1 : 2 : 4  
 Aggregate - Brick Chips  
 - Sylhet Sand  
 Reinforcement - 60 Grade  
 Clear Cover - 3/4 inch

Detail 04: RC Post (Long Section)

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: PORSHA, NAOGAON

TYPE DP 2 : MUD WALL

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

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CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

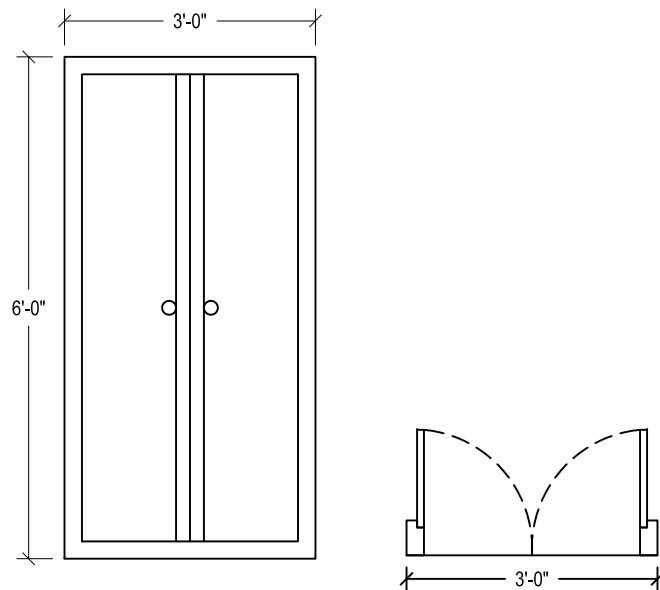
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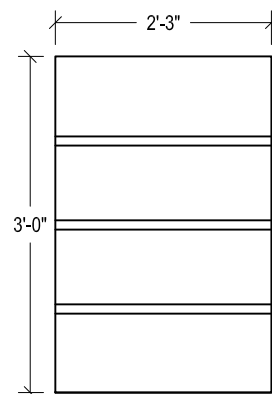
JULY, 2015

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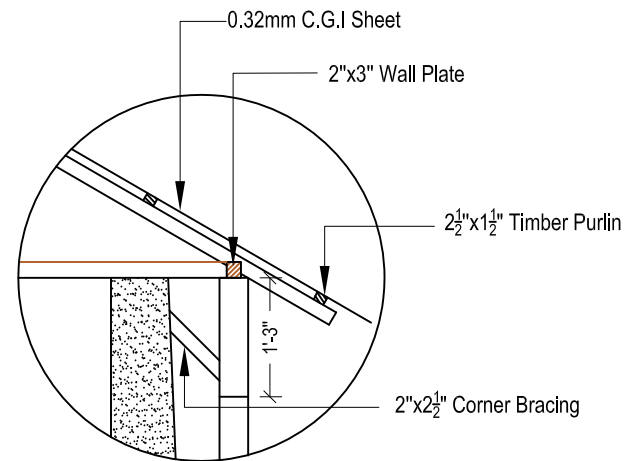
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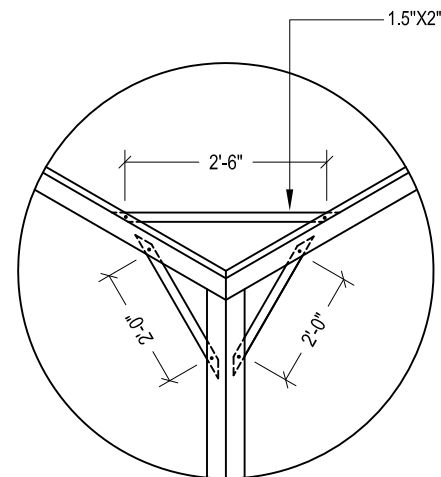
Detail 05: Door



Detail 06: Window



Detail 07: Corner Bracing and Roof Arrangement



Detail 08: Corner Bracing

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: PORSHA, NAOGAON

TYPE DP 2 : MUD WALL

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

DETAIL

JULY, 2015

SHEET NO:

S - 06

MEMBER SCHEDULE				
SL.	ITEMS NAME	DIMENSIONS	MATERIALS NAME	REMARKS
1.	Roof Cover	0.32 mm	CGI Sheet	
2.	Purlin (Top)	2.5"X2.5"	Timber	
3.	Purlin	2.5"X1.5"	Timber	@ 2'-6" C/C
4.	Rafter	2"X2.5" Timber & 2" to 2.5" dia Bamboo	Timber & Bamboo	@ 2'-6" to 3'-6" C/C (Alternate)
5.	Tie Beam (upper)	2"X1.5" Timber & 2" dia Bamboo	Timber & Bamboo	
6.	Roof Beam	2.5"X3.5" Timber & 3" dia Bamboo	Timber & Bamboo	@ 4'-0" C/C (Alternate)
8.	Wall Plate	2"x3"	Timber	
9.	Corner Bracing	2"x2.5"	Timber	Both top and bottom
10.	Tati Wall	5" thick	Mud	Localy available -- Stick
11.	Main Post	3" dia	Bamboo	With <i>Katla</i>
12.	Corner Post	4"x4"x11'	R C	4-8 mm Ø 1:2:4 Concrete
13.	Fance Supporting Post	2" dia	Bamboo	Without <i>Katla</i>
14.	Door	3'-0"x6'-0"	Timber	Position may be changed
15.	Window	2'-3"x3'-0"	Mud	Position may be changed

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: PORSHA, NAOGAON

TYPE DP 2 : MUD WALL

## CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

## DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

## DRAWN BY:

MD. ABU SAYED RASHED

## CLIENT

## FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXENBOURG

## DRAWING TITLE:

MEMBER SCHEDULE

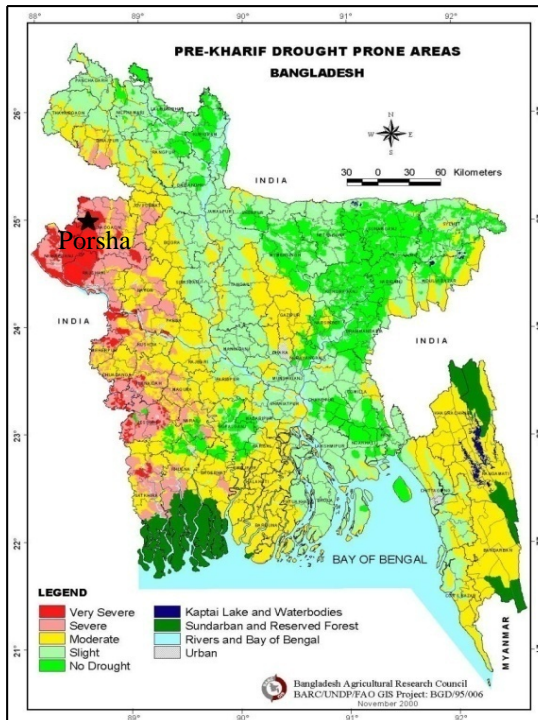
JULY, 2015

SHEET NO:

S - 07

## DIVISION: RAJSHAHI

### 16. DESIGN OF LCH IN PORSHA: TYPE – 2.2



#### SITE TOPOGRAPHY



#### General Information:

##### Location:

District: Naogoan

Upazila: Porsha

Union: Chawer

Mouza/ Village: Uchadanga

##### Climatic Feature: Dry and cold

Avg. Maximum Temperature: 38 °C

Avg. Minimum temperature: 12°C

Annual Rainfall: 1862 mm

Average Relative Humidity: 74%

##### Geotechnical Feature:

Topography: Uneven land

MSL: 31 m

Soil Characteristics: Silt

##### Disaster:

Drought, cold wave, earthquake, storm



**Completed House**

#### Design Considerations:

Available Building Materials: Mud, Bamboo, Timber, *Binna* grass etc

Foundation: Bamboo posts/ *katla* embedded in soil (1-2 ft)

Plinth: Mud

Post: RC and bamboo posts with *katla*/without *katla*

Fence/Wall: *Tati* (bamboo sticks with mud plaster)

Openings: 1 main door + 1 inside door to connect rooms

Ceiling: Ceiling is considered to protect heat and cold

Rain water harvesting system

Roof Type: Four pitched

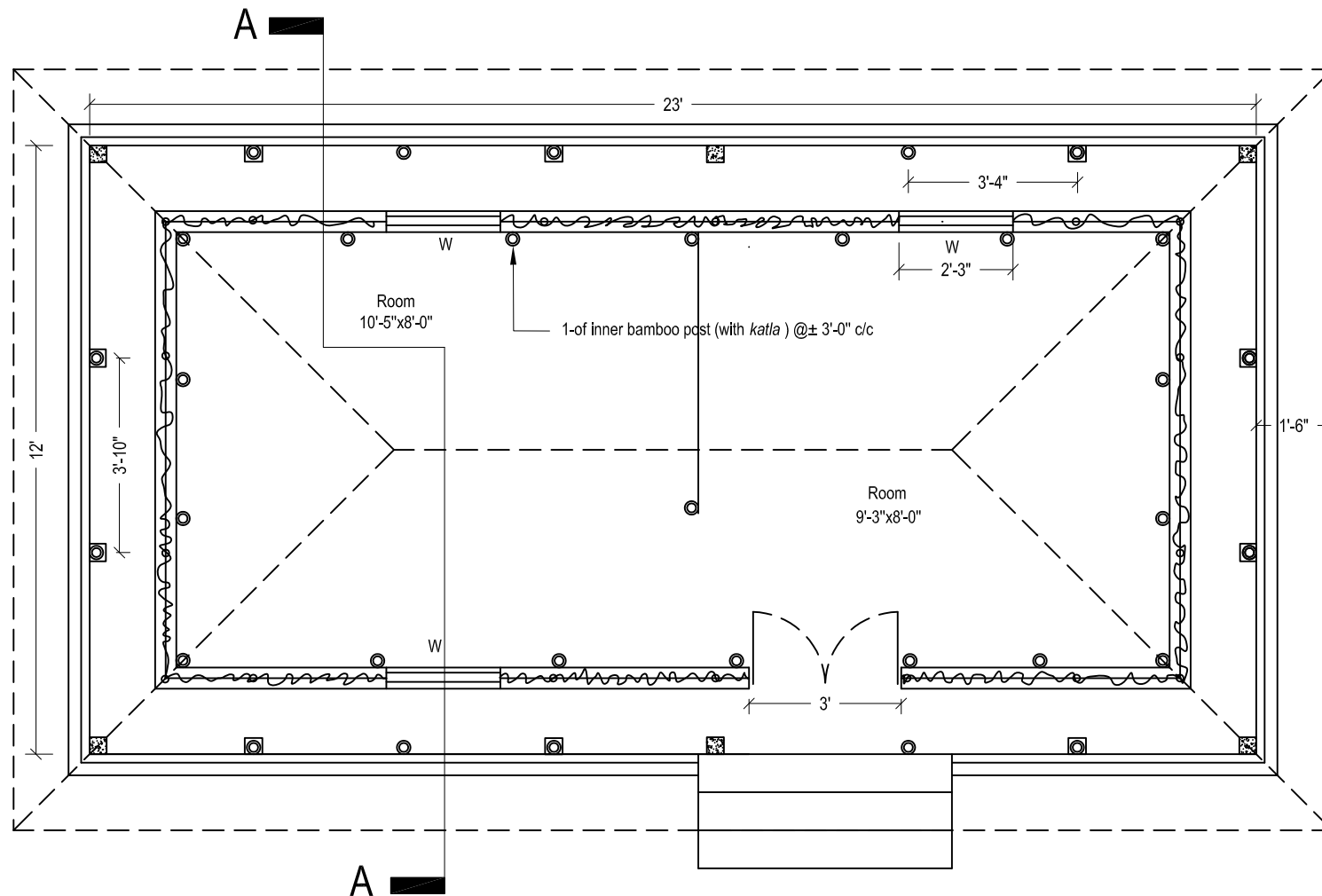
Roof cover: CGI sheets

Roof structure: Wooden truss

Bracing: Corner bracing

Joints: Nails, notches, GI wire

Cost: Tk. 80,000



PLAN

- RC Post
- Bamboo post With Katla
- Bamboo post

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: PORSHA, NAOGAON

TYPE 2 : TATI WALL HOUSE

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

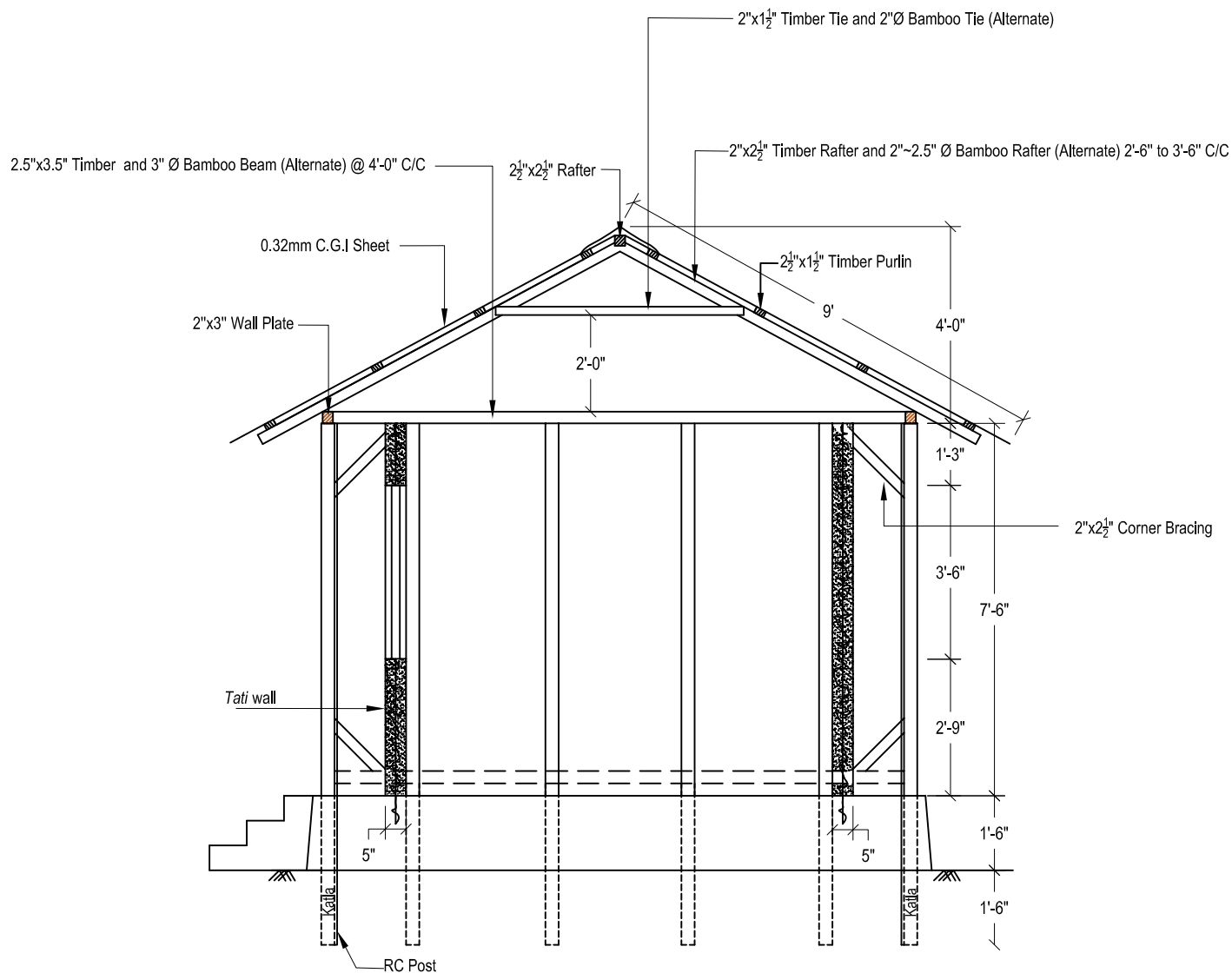
DRAWING TITLE:

PLAN

JULY, 2015

SHEET NO:

S - 01



SECTION: A - A

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: PORSHA, NAOGAON

TYPE 2 : TATI WALL HOUSE

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

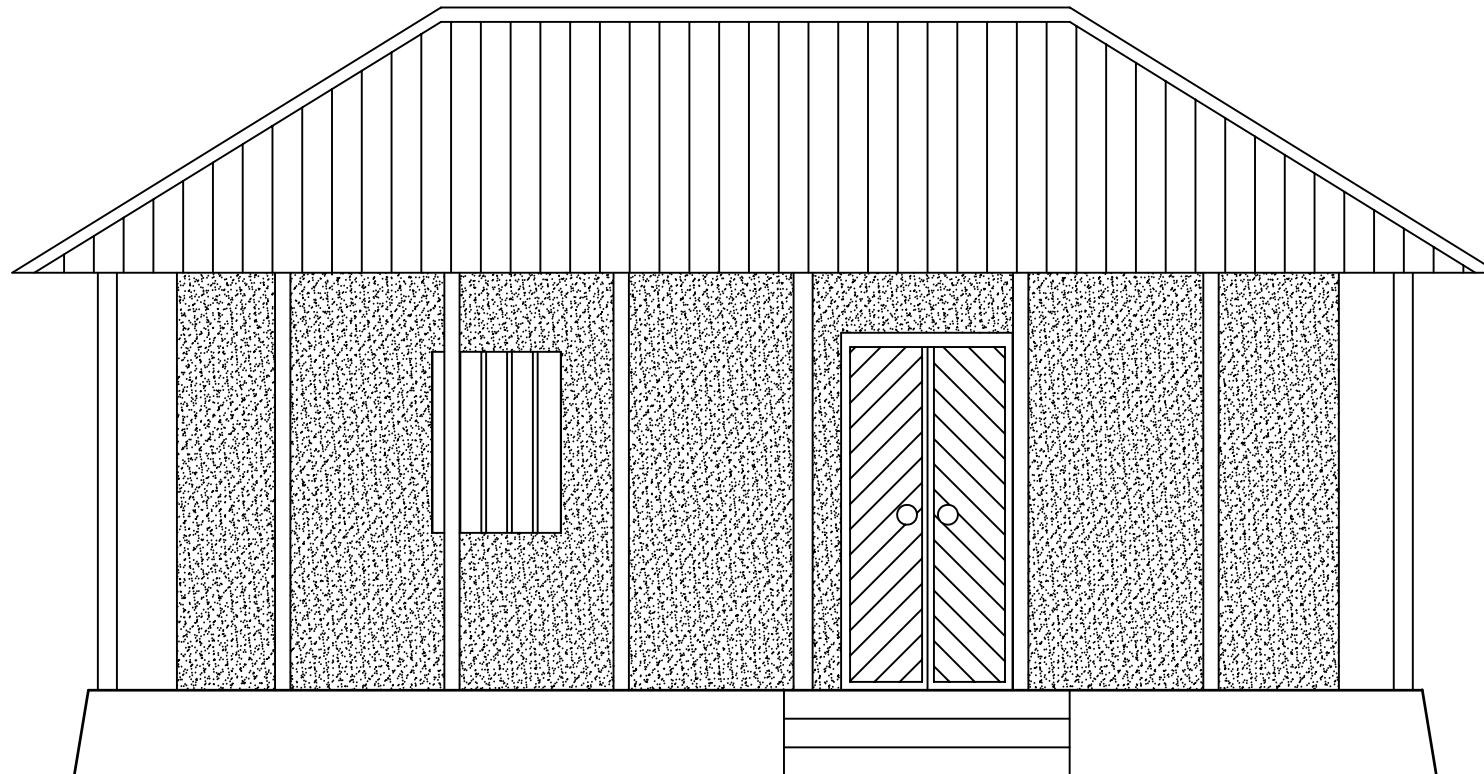
DRAWING TITLE:

SECTION Z - Z

JULY, 2015

SHEET NO:

S - 02



FRONT ELEVATION

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: PORSHA, NAOGAON

TYPE 2 : TATI WALL HOUSE

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

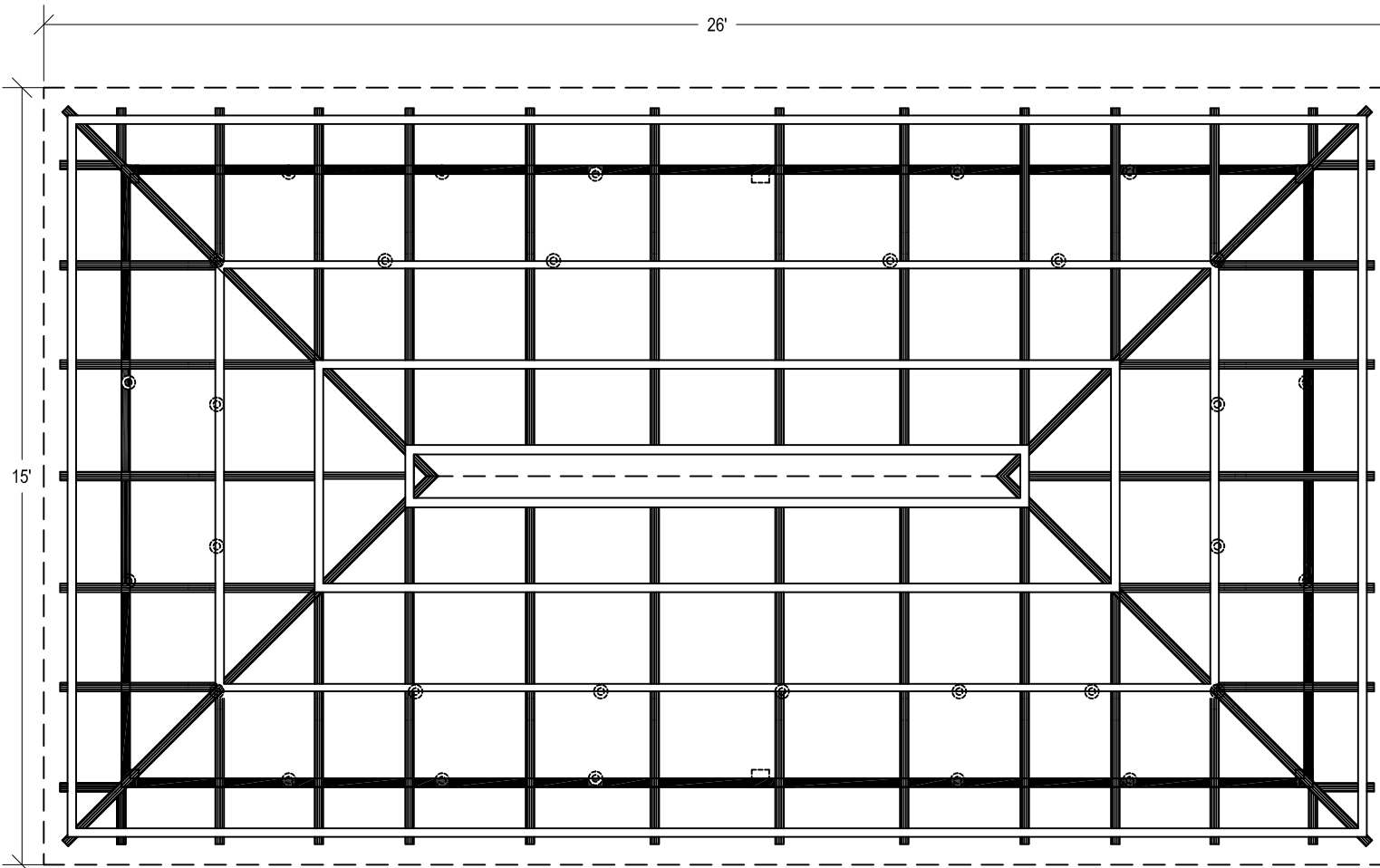
FRONT ELEVATION

JULY, 2015

SHEET NO:

S - 03

D116



PLAN OF ROOF TRUSS SYSTEM

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: PORSHA, NAOGAON

TYPE 2 : TATI WALL HOUSE

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

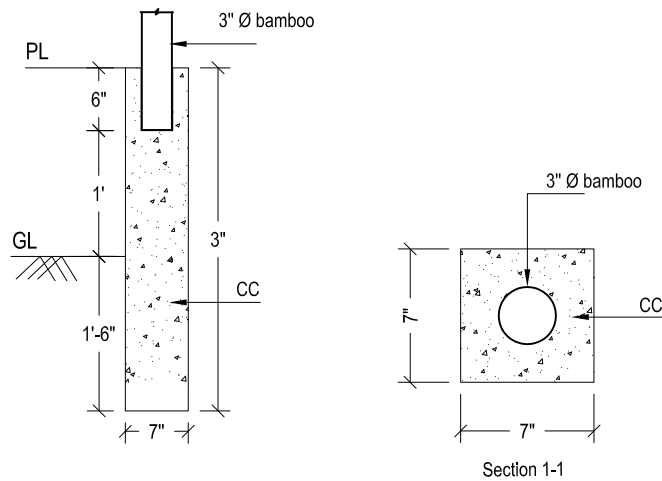
PLAN OF TRUSS SYSTEM

JULY, 2015

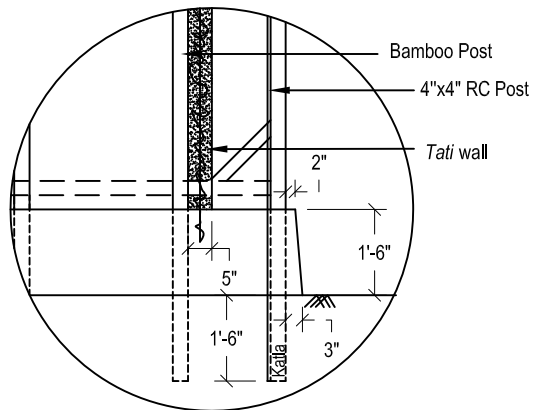
SHEET NO:

S - 04

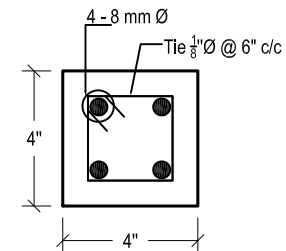




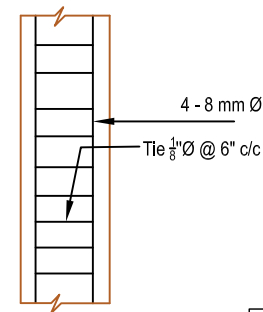
Detail 01: Bamboo into C C Katla



Detail 02: Plinth



Detail 03: RC Post (Cross Section)

**NOTE :**

Concrete	- 1 : 2 : 4
Aggregate	- Brick Chips
	- Sylhet Sand
Reinforcement	- 60 Grade
Clear Cover	- 3/4"

Detail 04: RC Post (Long Section)

**PROJECT NAME :**

**CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)**

LOCATION: PORSHA, NAOGAON

TYPE 2 : TATI WALL HOUSE

**CONSULTANTS**

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESH



ENSAG-CRATERRE  
Grenoble, France

**DESIGN BY:****BUET**

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

**CRATERRE**

3. Engr. Olivier Moles

**Caritas, Bangladesh**

1. Mr. Ratan Kumar Podder

**DRAWN BY :**

MD. ABU SAYED RASHED

**CLIENT****FUNDING AGENCIES**

CARITAS  
BANGLADESH



CARITAS FRANCE



CARITAS  
LUXEMBOURG

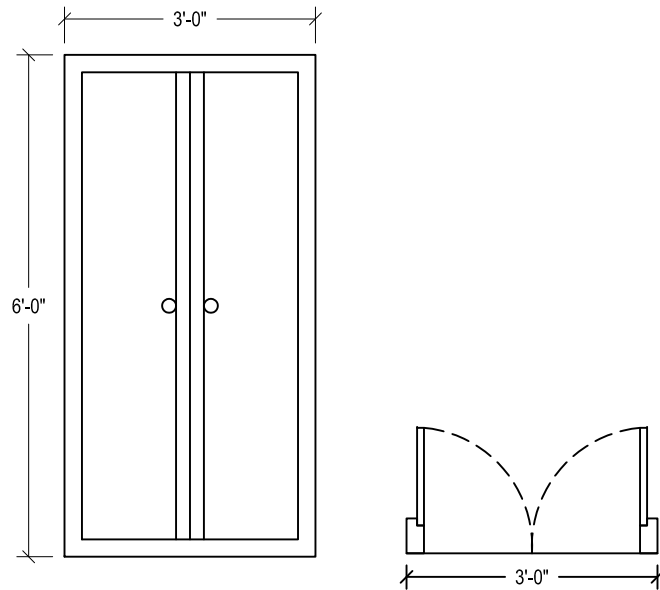
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DETAIL

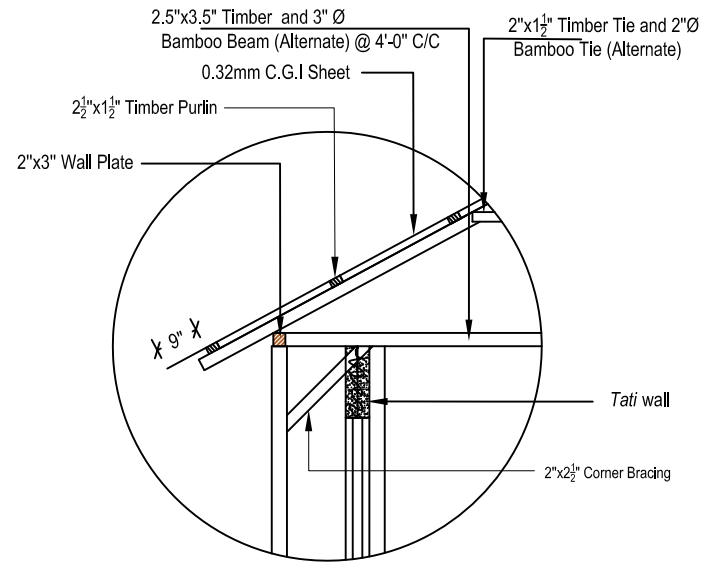
JULY, 2015

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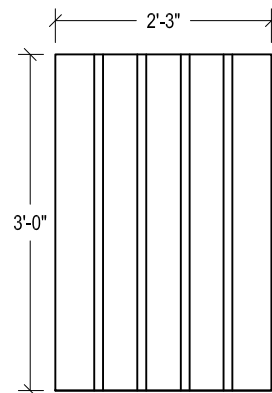
S - 05



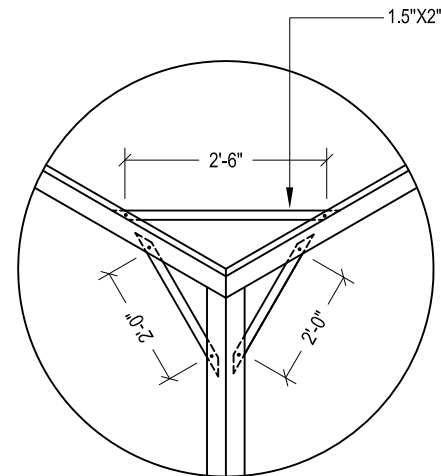
Detail 05: Door



Detail 07: Corner Bracing and Roof Arrangement



Detail 06: Window



Detail 08: Corner Bracing

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: PORSHA, NAOGAON

TYPE 2 : TATI WALL HOUSE

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

DETAIL

JULY, 2015

SHEET NO:

S - 06

MEMBER SCHEDULE				
SL.	ITEMS NAME	DIMENSIONS	MATERIALS NAME	REMARKS
1.	Roof Cover	0.32 mm	CGI Sheet	
2.	Purlin (Top)	2.5"X2.5"	Timber	
3.	Purlin	2.5"X1.5"	Timber	@ 2'-6" C/C
4.	Rafter	2"X2.5" Timber & 2" to 2.5" dia Bamboo	Timber & Bamboo	@ 2'-6" to 3'-6" C/C (Alternate)
5.	Tie Beam (upper)	2"X1.5" Timber & 2" dia Bamboo	Timber & Bamboo	
6.	Roof Beam	2.5"X3.5" Timber & 3" dia Bamboo	Timber & Bamboo	@ 4'-0" C/C (Alternate)
8.	Wall Plate	2"x3"	Timber	
9.	Corner Bracing	2"x2.5"	Timber	Both top and bottom
10.	Tati Wall	5" thick	Mud	Locally available -- Stick
11.	Main Post	3" dia	Bamboo	With <i>Katla</i>
12.	Corner Post	4"x4"x11'	R C	4-8 mm Ø 1:2:4 Concrete
13.	Fance Supporting Post	2" dia	Bamboo	Without <i>Katla</i>
14.	Door	3'-0"x6'-0"	Timber	Position may be changed
15.	Window	2'-3"x3'-0"	Mud	Position may be changed

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: PORSHA, NAOGAON

TYPE 2 : TATI WALL HOUSE

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain  
2. Prof. Dr. Mohammad Shariful Islam

CRAAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXENBOURG

DRAWING TITLE:

MEMBER SCHEDULE

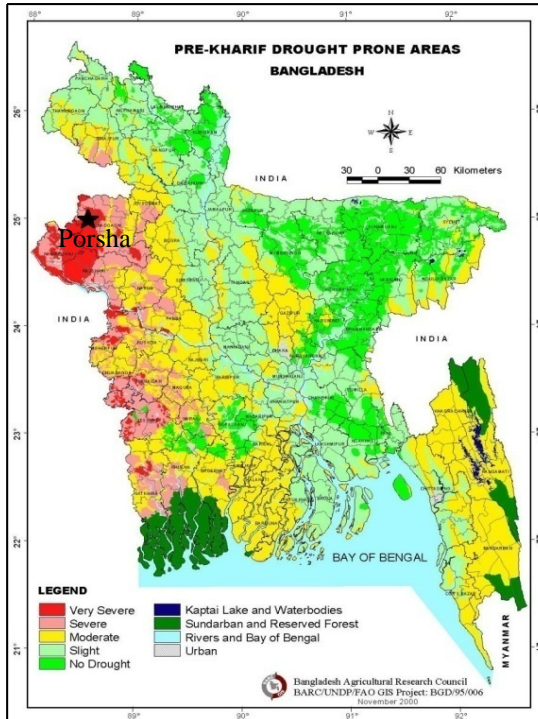
JULY, 2015

SHEET NO:

S - 07

## DIVISION: RAJSHAHI

### 17. DESIGN OF LCH IN PORSHA: TYPE – DP 1



#### SITE TOPOGRAPHY



#### General Information:

##### Location:

District: Naogoan

Upazila: Porsha

Union: Chawer

Mouza/ Village: Uchadanga

##### Climatic Feature: Dry and cold

Avg. Maximum Temperature: 38 °C

Avg. Minimum temperature: 12°C

Annual Rainfall: 1862 mm

Average Relative Humidity: 74%

##### Geotechnical Feature:

Topography: Uneven land

MSL: 31 m

Soil Characteristics: Silt

##### Disaster:

Drought, cold wave, earthquake, storm



Completed House

#### Design Considerations:

Available Building Materials: Mud, Bamboo, Timber, *Binna* grass etc

Foundation: Bamboo posts/ *katla* embedded in soil (1-2 ft)

Plinth: Mud

Post: RC and bamboo posts with *katla*/without *katla*

Fence/Wall: Mud

Openings: 1 main door

Ceiling: Ceiling is considered to protect heat & cold & storage

Rain water harvesting system

Roof Type: Four pitched

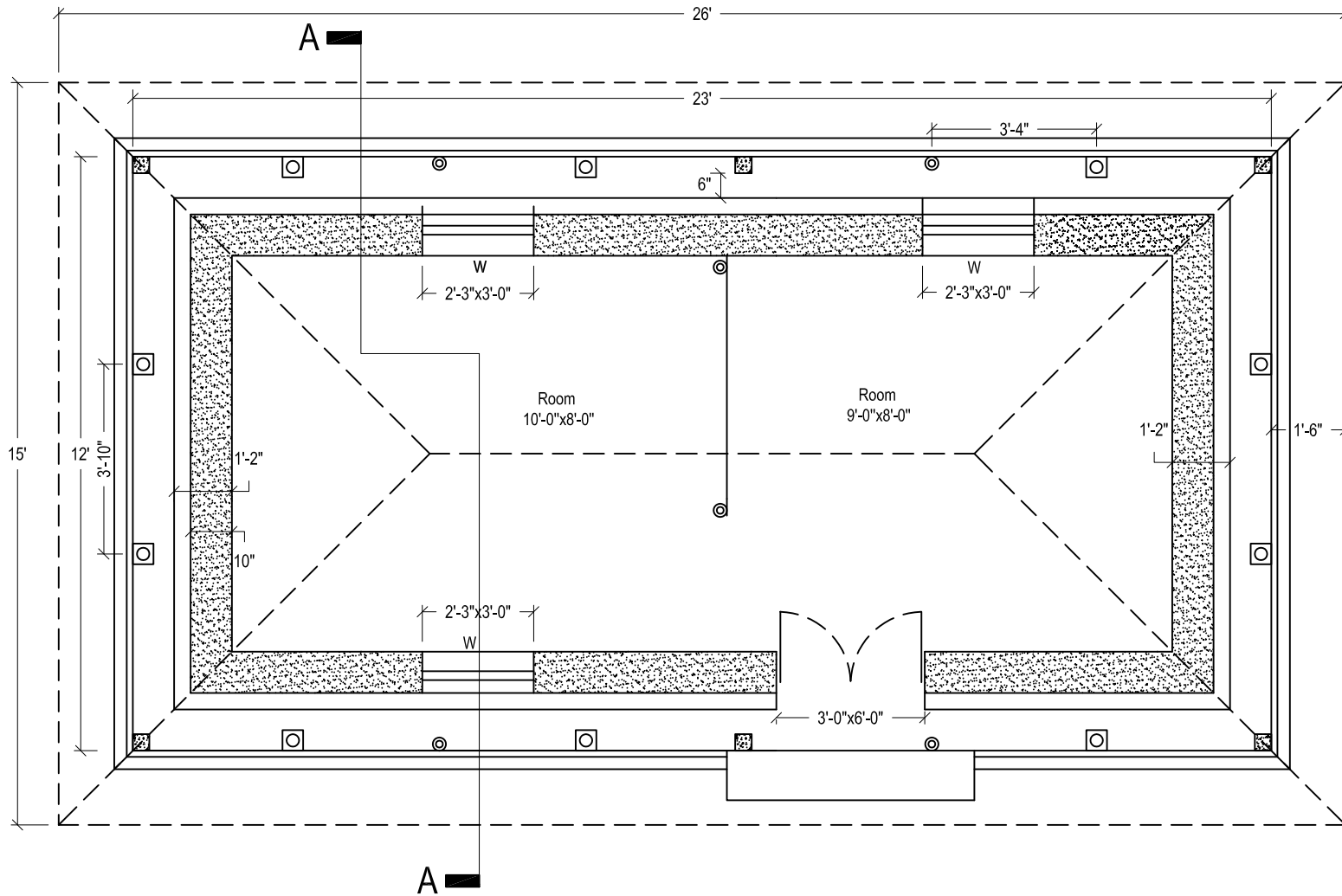
Roof cover: CGI sheets

Roof structure: Wooden truss

Bracing: Corner bracing

Joints: Nails, notches, GI wire

Cost: Tk. 80,000



PLAN

-  4"x4" RC Post
-  3"Ø Bamboo post
-  5"x5" Katla With 3"Ø Bamboo post

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: PORSHA, NAOGAON

TYPE DP-1 : MUD WALL HOUSE

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

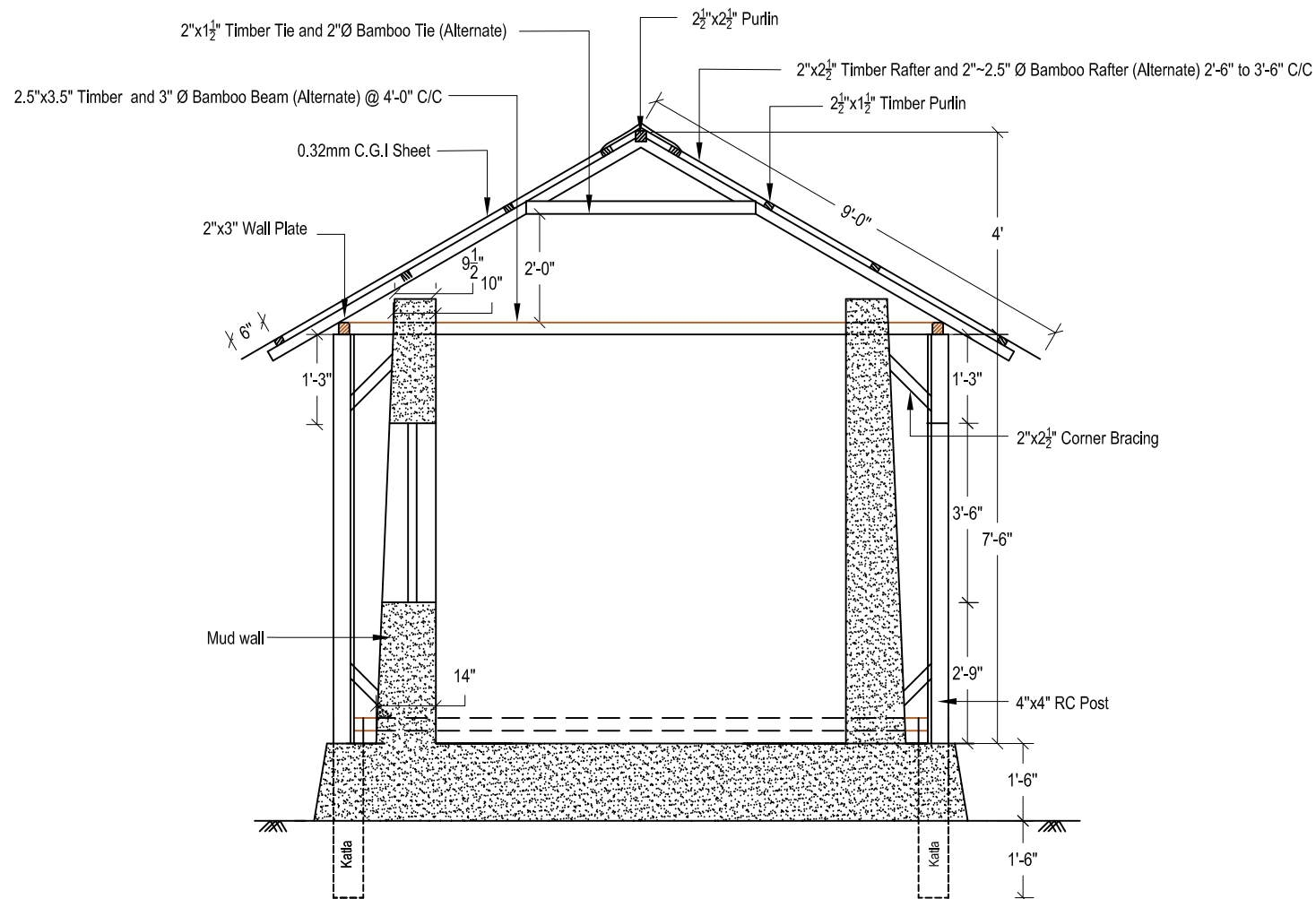
DRAWING TITLE:

PLAN

JULY, 2015

SHEET NO:

S - 01



SECTION: A-A

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: PORSHA, NAOGAON

TYPE DP-1 : MUD WALL HOUSE

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

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CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

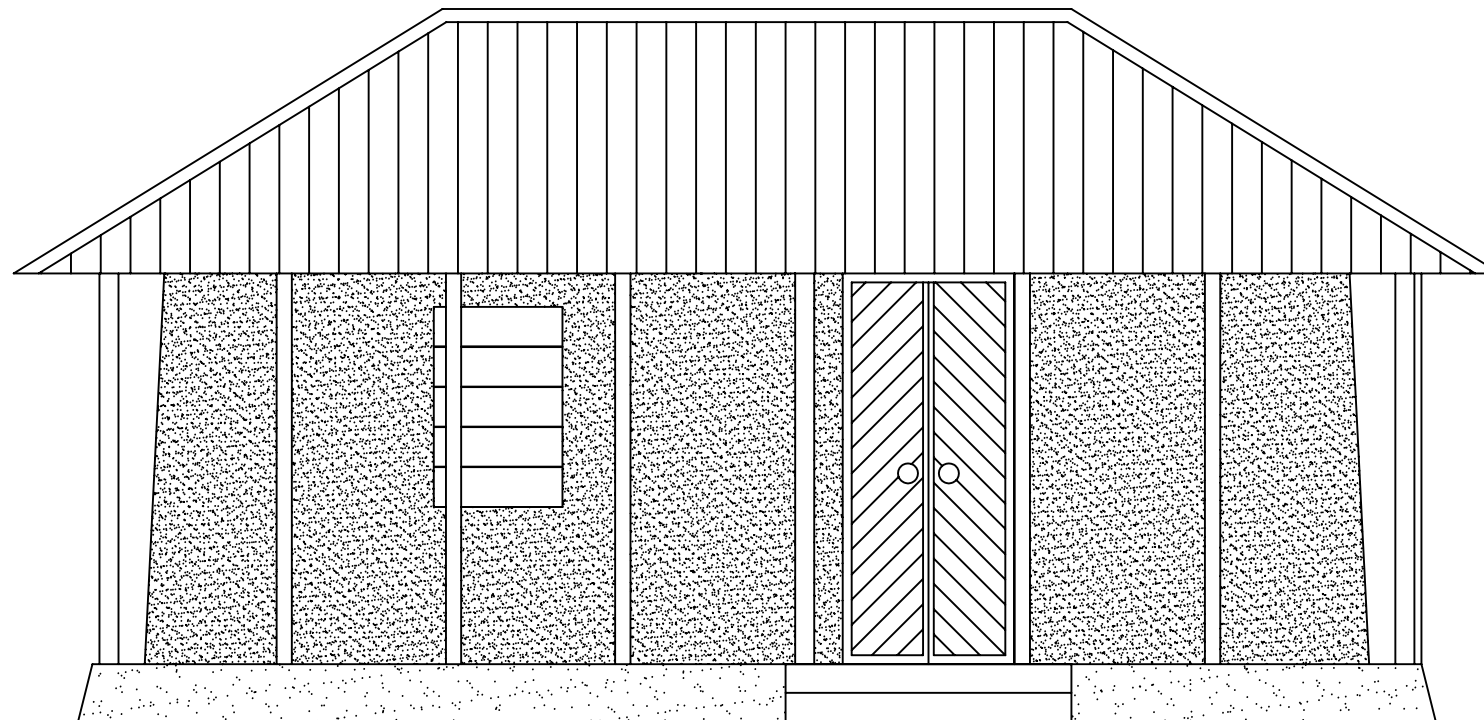
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SECTION A-A

JULY, 2015

SHEET NO:

S - 02



FRONT ELEVATION

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: PORSHA, NAOGAON

TYPE DP-1 : MUD WALL HOUSE

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAtterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAtterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

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CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

FRONT ELEVATION

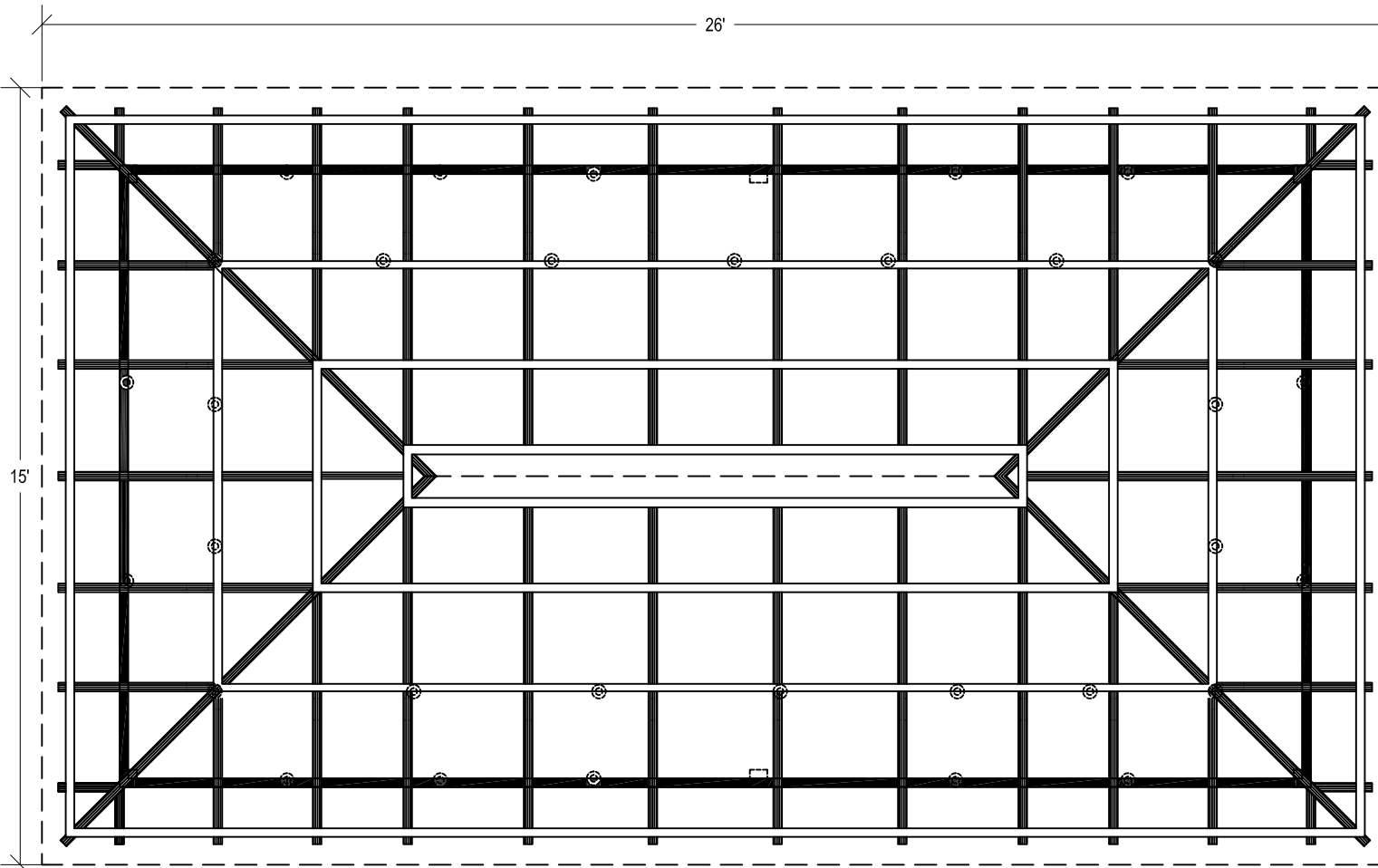
JULY, 2015

SHEET NO:

S - 03



D/124



PLAN OF TRUSS SYSTEM

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: PORSHA, NAOGAON

TYPE DP-1 : MUD WALL HOUSE

CONSULTANTS



DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESH



ENSAG-CRATERre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRATERre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES



CARITAS  
BANGLADESH



CARITAS FRANCE



CARITAS  
LUXEMBOURG

DRAWING TITLE:

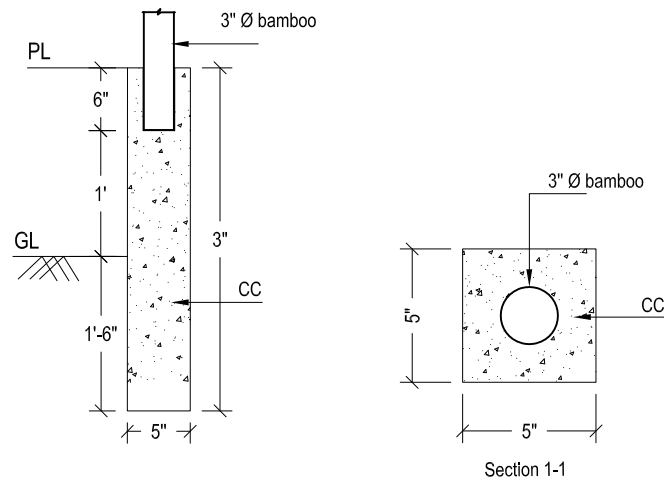
PLAN OF TRUSS SYSTEM

JULY, 2015

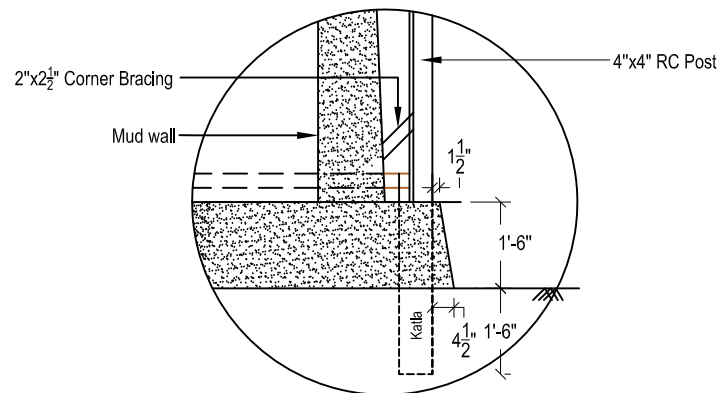
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S - 04

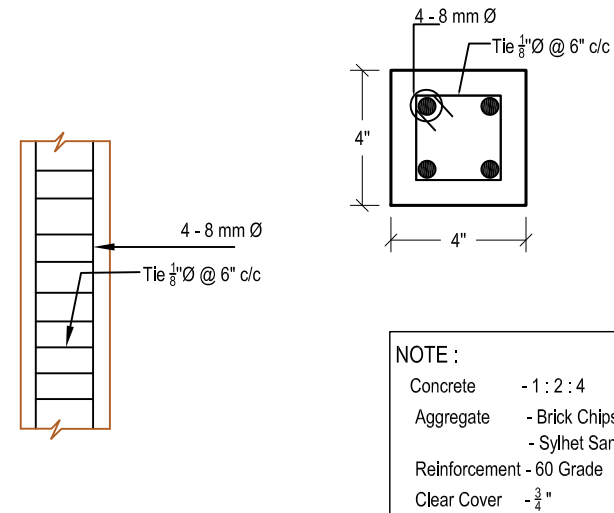




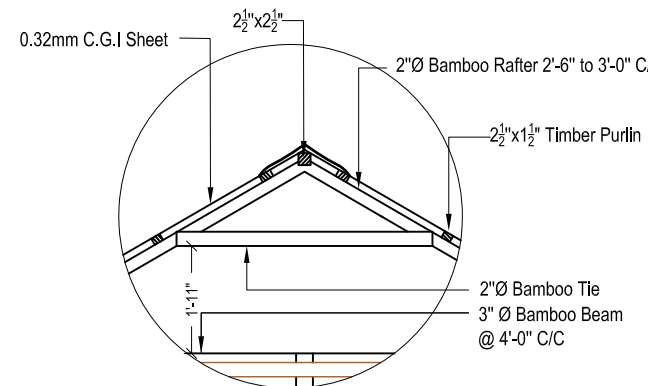
Detail 01: Bamboo into C C Katla



Detail 02: Plinth



Detail 03: RC Post (Long Section and Cross Section)



Detail 04: Roof Top

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: PORSHA, NAOGAON

TYPE DP-1 : MUD WALL HOUSE

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

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2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

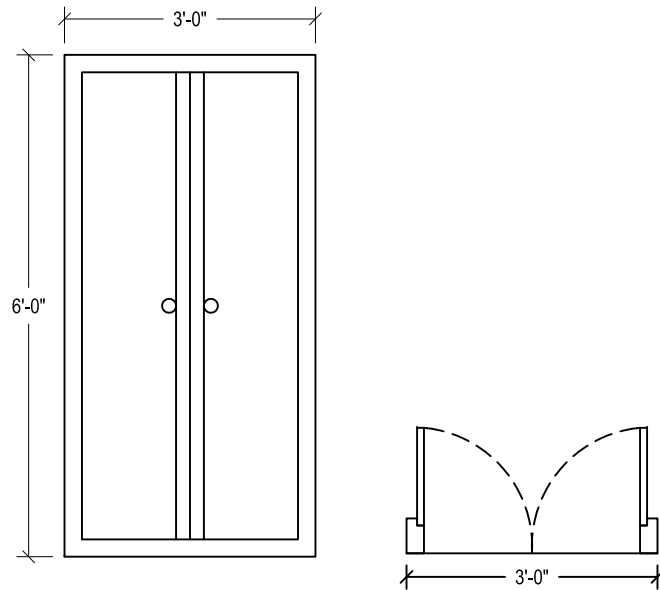
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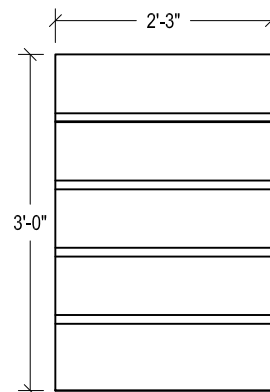
JULY, 2015

SHEET NO:

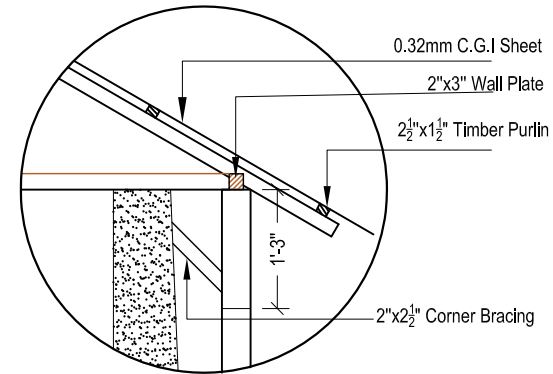
S - 05



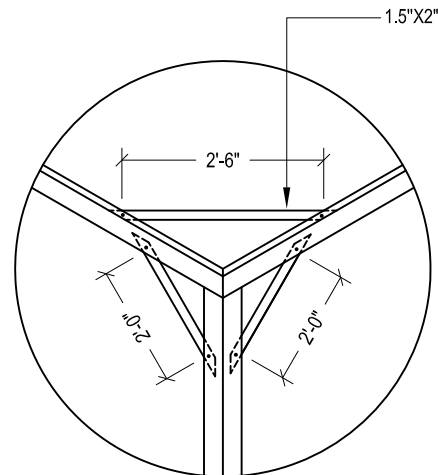
Detail 05: Door



Detail 06: Window



Detail 07: Corner Bracing and Roof Arrangement



Detail 08: Corner Bracing

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: PORSHA, NAOGAON

TYPE DP-1 : MUD WALL HOUSE

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRATERre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRATERre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

DETAIL

JULY, 2015

SHEET NO:

S - 06

MEMBER SCHEDULE				
SL.	ITEMS NAME	DIMENSIONS	MATERIALS NAME	REMARKS
1.	Roof Cover	0.32 mm	CGI Sheet	
2.	Purlin (Top)	2.5"X2.5"	Timber	
3.	Purlin	2.5"X1.5"	Timber	@ 2'-6" C/C
4.	Rafter	2"X2.5" Timber & 2" to 2.5" dia Bamboo	Timber & Bamboo	@ 2'-6" to 3'-6" C/C (Alternate)
5.	Tie Beam	2"X1.5" Timber & 2" dia Bamboo	Timber & Bamboo	
6.	Roof Beam	2.5"X3.5" Timber & 3" dia Bamboo	Timber & Bamboo	@ 4'-0" C/C (Alternate)
8.	Wall Plate	2"x3"	Timber	
9.	Corner Bracing	2"x2.5"	Timber	Both top and bottom
10.	Mud Wall	10" thick	Mud	Plastic clay
11.	Interior Post	3" dia	Bamboo	With <i>Katla</i>
12.	Corner Post	4"x4"x11'-0"	R C	4-8 mm Ø 1:2:4 Concrete
13.	Fance Supporting Post	2" dia	Bamboo	Without <i>Katla</i>
14.	Door	3'-0"x6'-0"	Timber	Position may be changed
15.	Window	2'-3"x3'-0"	Mud	Position may be changed

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: PORSHA, NAOGAON

TYPE DP-1 : MUD WALL HOUSE

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain  
2. Prof. Dr. Mohammad Shariful Islam

CRAAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

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CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXENBOURG

DRAWING TITLE:

MEMBER SCHEDULE

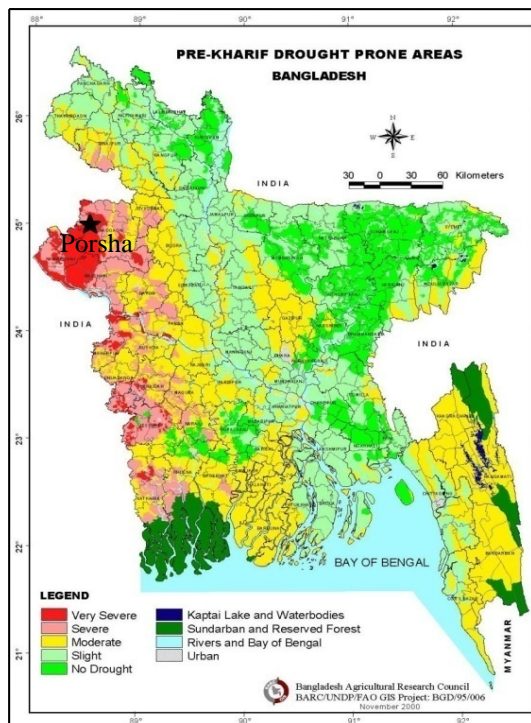
JULY, 2015

SHEET NO:

S - 07

## DIVISION: RAJSHAHI

### 18. DESIGN OF LCH IN TARASH: TYPE – DP 2



#### General Information:

##### Location:

District: Sirajgonj

Upazila: Tarash

Union: Naogoan

Mouza/ Village: Naogoan

##### Climatic Feature: Dry

Avg. Maximum Temperature: 35 °C

Avg. Minimum temperature: 12°C

Annual Rainfall: 1610 mm

Average Relative Humidity: 74%

##### Geotechnical Feature:

Topography: Low land

MSL: 7 m

Soil Characteristics: Silt

##### Disaster:

Flood with rain water and strong wind



**Completed House**

#### Design Considerations:

Available Building Materials: Mud, Bamboo, Timber, *Binna* grass etc

Foundation: Bamboo posts/ *katla* embedded in soil (1-2 ft)

Plinth: Mud

Post: RC and bamboo posts with *katla*/without *katla*

Fence/Wall: Bamboo mat over CGI sheet

Openings: 1 main door + 1 inside door to connect rooms

Ceiling: Ceiling is considered to protect heat and cold

Rain water harvesting system

Roof Type: Four pitched

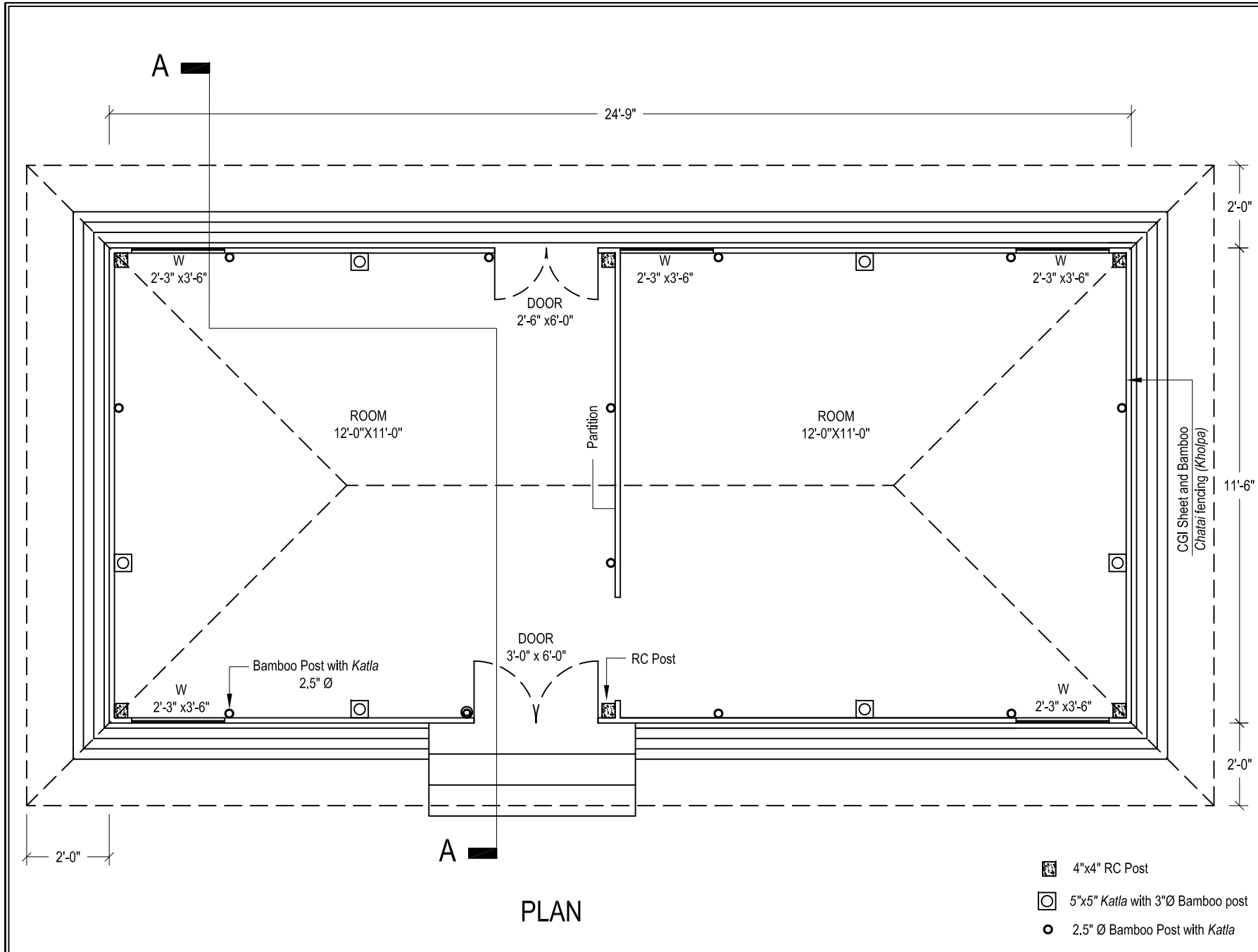
Roof cover: CGI sheets

Roof structure: Wooden truss

Bracing: Corner bracing

Joints: Nails, notches, GI wire

Cost: Tk. 85,000



PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: TARASH, SIRAJGANJ

TYPE DP-2 : CGI Sheet with Double Fence

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

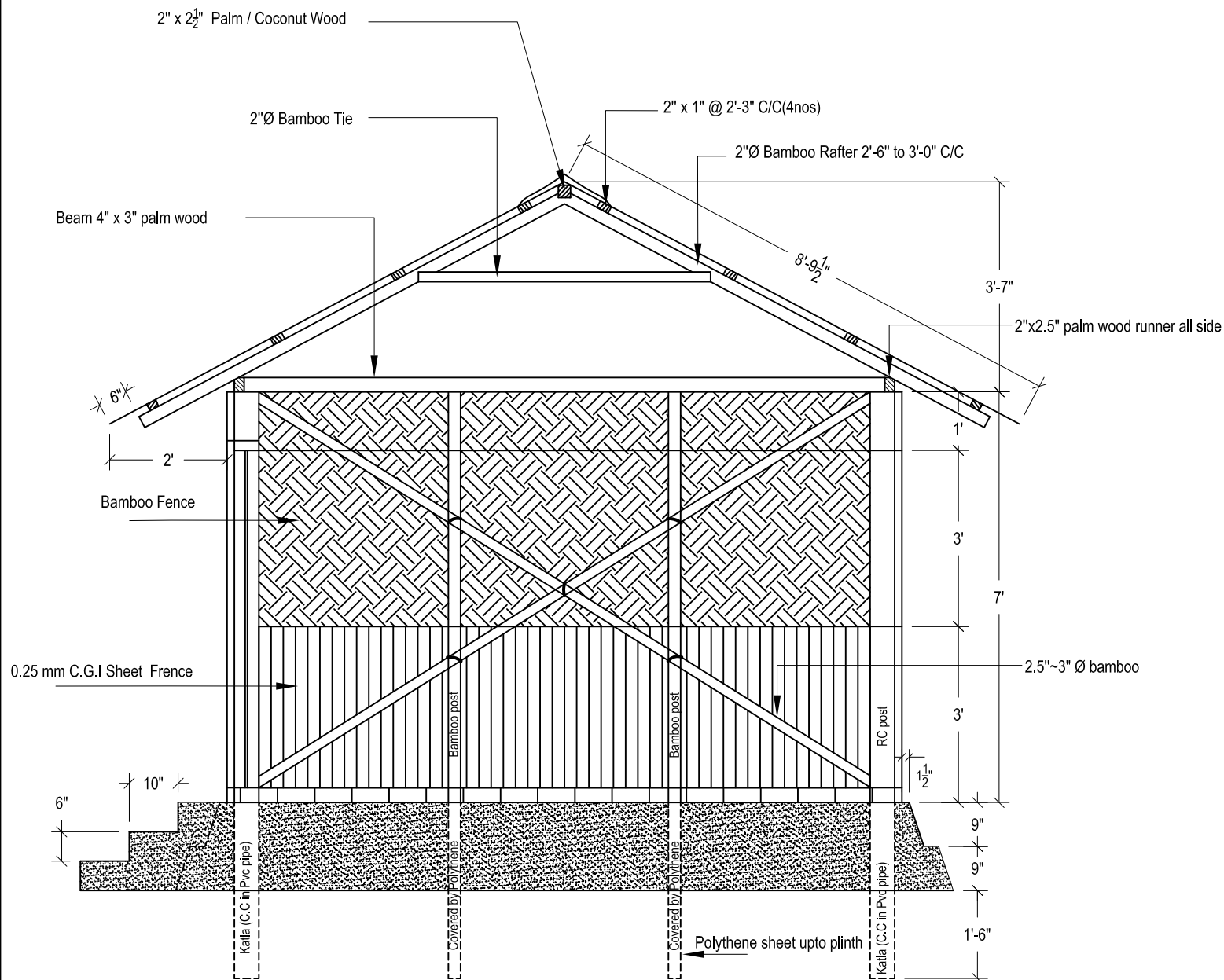
DRAWING TITLE:

PLAN

JULY, 2015

SHEET NO:

S - 01



SECTION: A - A

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: TARASH, SIRAJGANJ

TYPE DP-2 : CGI Sheet with Double Fence

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRATERRE  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRATERRE

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

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CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

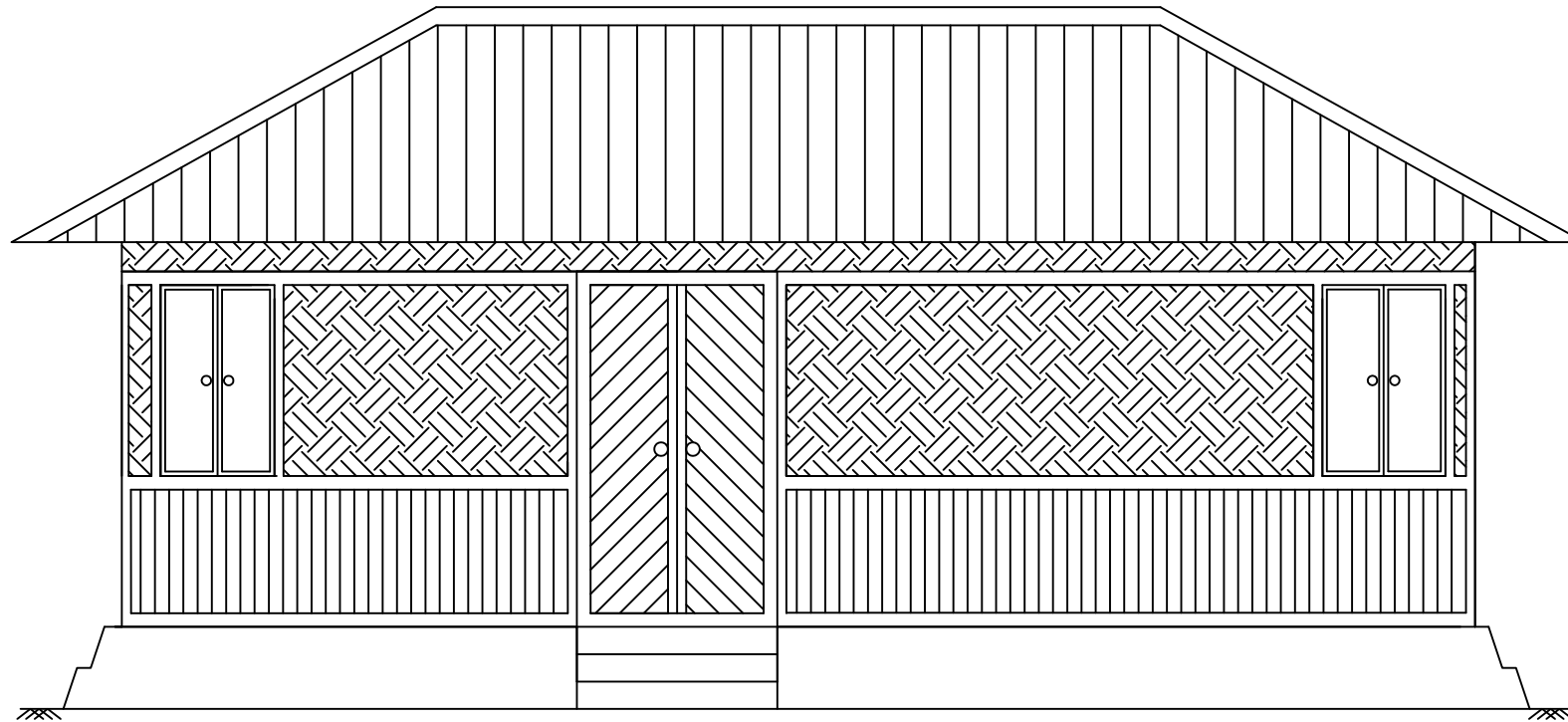
DRAWING TITLE:

SECTION: A-A

JULY, 2015

SHEET NO:

S - 02



FRONT ELEVATION

**PROJECT NAME :****CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)**

LOCATION: TARASH, SIRAJGANJ

TYPE DP-2 : CGI Sheet with Double Fence

**CONSULTANTS**DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France**DESIGN BY:****BUET**

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

**CRAterre**

3. Engr. Olivier Moles

**Caritas, Bangladesh**

1. Mr. Ratan Kumar Podder

**DRAWN BY :**

MD. ABU SAYED RASHED

**CLIENT**CARITAS  
BANGLADESH**FUNDING AGENCIES**

CARITAS FRANCE

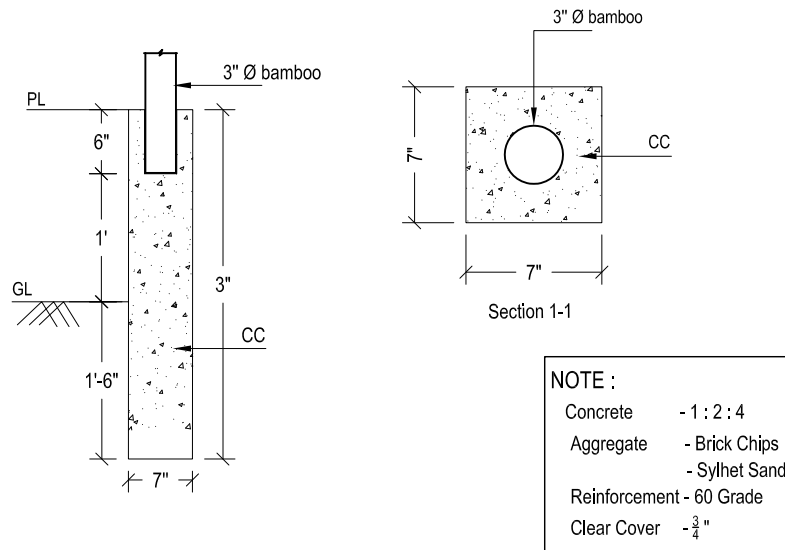
CARITAS  
LUXEMBOURG**DRAWING TITLE:**

FRONT ELEVATION

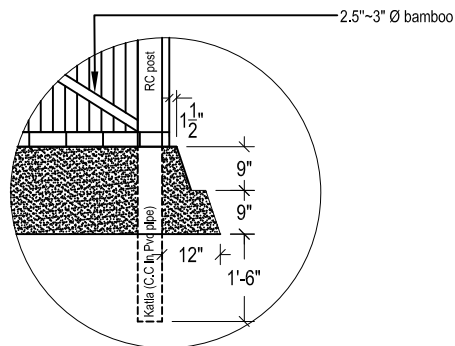
JULY, 2015

SHEET NO:

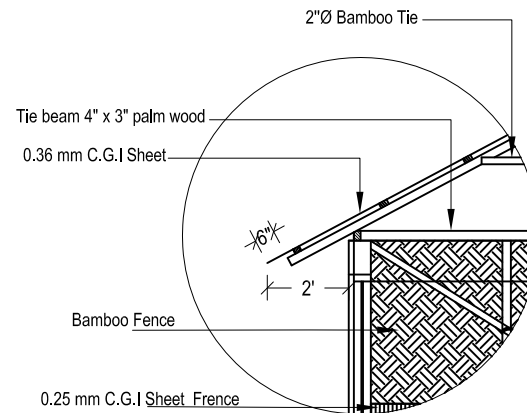
S - 03



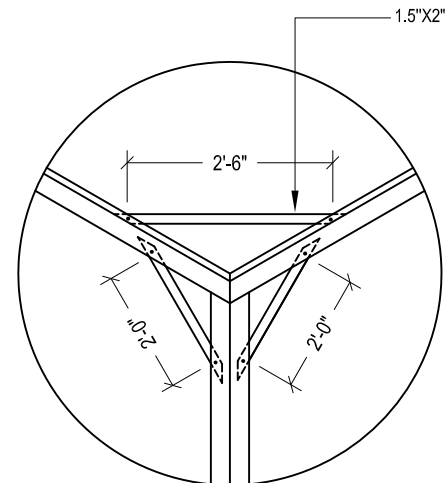
Detail 01: Bamboo into C C Katla



Detail 02: Plinth



Detail 03: Corner Bracing and Roof Arrangement



Detail 04: Corner Bracing

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: TARASH, SIRAJGANJ

TYPE DP-2 : CGI Sheet with Double Fence

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRATERRE  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain  
2. Prof. Dr. Mohammad Shariful Islam

CRATERRE

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

Md. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

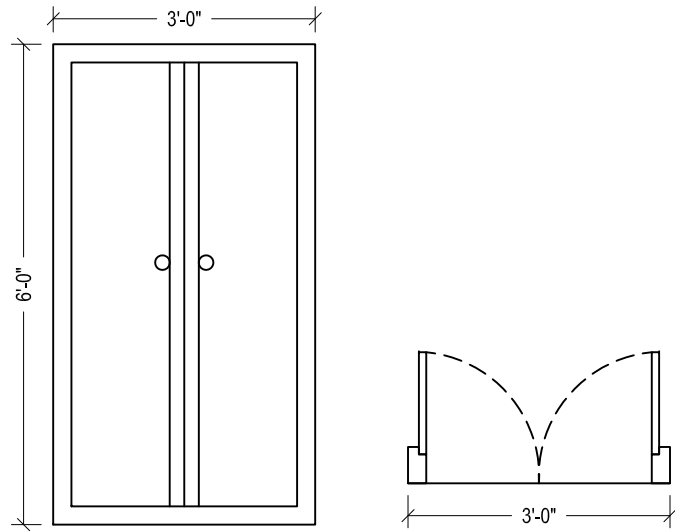
DETAILS

JULY, 2015

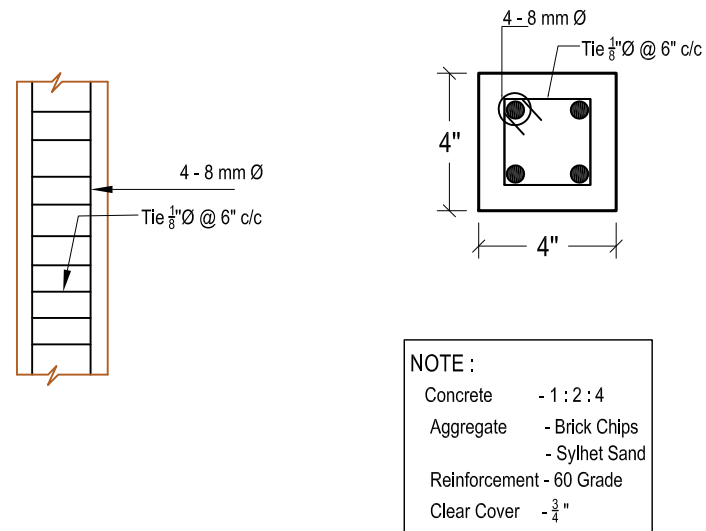
SHEET NO:

S - 04

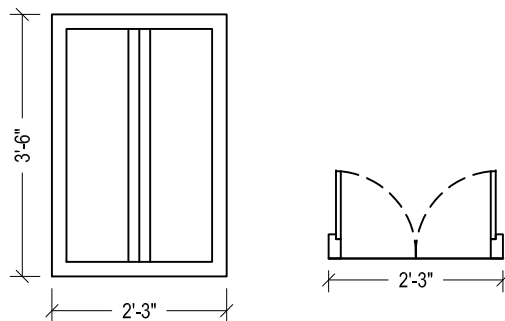




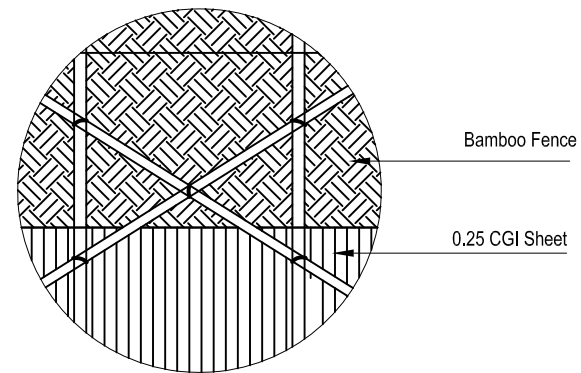
Detail 05: Door



Detail 07: RC Post (Long Section &amp; Cross Section)



Detail 06: Window



Detail 08: CGI Sheet &amp; Bamboo Fence Joint

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: TARASH, SIRAJGANJ

TYPE DP-2 : CGI Sheet with Double Fence

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRaterre  
Grenoble, France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRaterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

Md. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

DETAILS

JULY, 2015

SHEET NO:

S - 05

MEMBER SCHEDULE				
SL.	ITEMS NAME	DIMENSIONS	MATERIALS NAME	REMARKS
1.	Roof Cover	0.32 mm	CGI Sheet	
2.	Purlin (Top)	2.5"X2.5"	Palm/Coconut wood	
3.	Purlin	2"X1"	Timber	@ 2'-3" C/C
4.	Rafter	2" dia	Bamboo	
5.	Corner Rafter	2"x2.5"	Timber	
6.	Tie Beam	2" dia	Bamboo	
8.	Roof Beam	4"X3"	Palm wood	@ 4'-0" C/C (Alternate)
9.	Wall Plate	2"x2.5"	Palm wood	
10.	Corner Bracing	2.5"x3"	Bamboo	Both top and bottom
11.	Fance (Upper Part)		Bamboo mat	4' height
12.	Fance (Bottom Part)	0.25mm	CGI Sheet	3' height
13.	Interior Post	3" dia	Bamboo	With <i>Katla</i>
14.	Corner Post	4"x4"x10'-0"	R C	4-8 mm Ø 1:2:4 Concrete
15.	Fance Supporting Post	2" dia	Bamboo	Without <i>Katla</i>
16.	Door	3'-0"x6'-0"	Timber	Position may be changed
17.	Window	2'-3"x3"-0"	Mud	Position may be changed

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: TARASH, SIRAJGANJ

TYPE DP-2 : CGI Sheet with Double Fence

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain  
2. Prof. Dr. Mohammad Shariful Islam

CRAAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXENBOURG

DRAWING TITLE:

MEMBER SCHEDULE

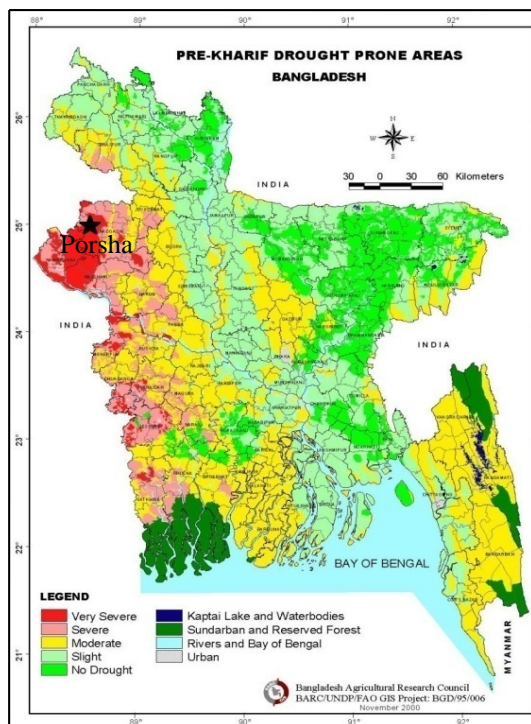
JULY, 2015

SHEET NO:

S - 06

## DIVISION: RAJSHAHI

### 19. DESIGN OF LCH IN PUTHIA: TYPE – DP 3



#### General Information:

##### Location:

District: Rajshahi  
Upazila: Puthia  
Union: Shilmaria  
Mouza/ Village: Joggopara

##### Climatic Feature: Dry and cold

Avg. Maximum Temperature: 38 °C  
Avg. Minimum temperature: 12°C  
Annual Rainfall: 1862 mm  
Average Relative Humidity: 74%

##### Geotechnical Feature:

Topography: Uneven land  
MSL: 15 m  
Soil Characteristics: Silt

##### Disaster:

Drought, cold wave, earthquake, storm



Completed House

#### Design Considerations:

Available Building Materials: Mud, Bamboo, Timber, *Binna* grass etc

Foundation: Bamboo posts/ *katla* embedded in soil (1-2 ft)

Plinth: Mud

Post: RC and bamboo posts with *katla*/without *katla*

Fence/Wall: Bamboo mat over CGI sheet

Openings: 1 main door + 1 inside door to connect rooms

Ceiling: Ceiling is considered to protect heat and cold

Rain water harvesting system

Roof Type: Four pitched

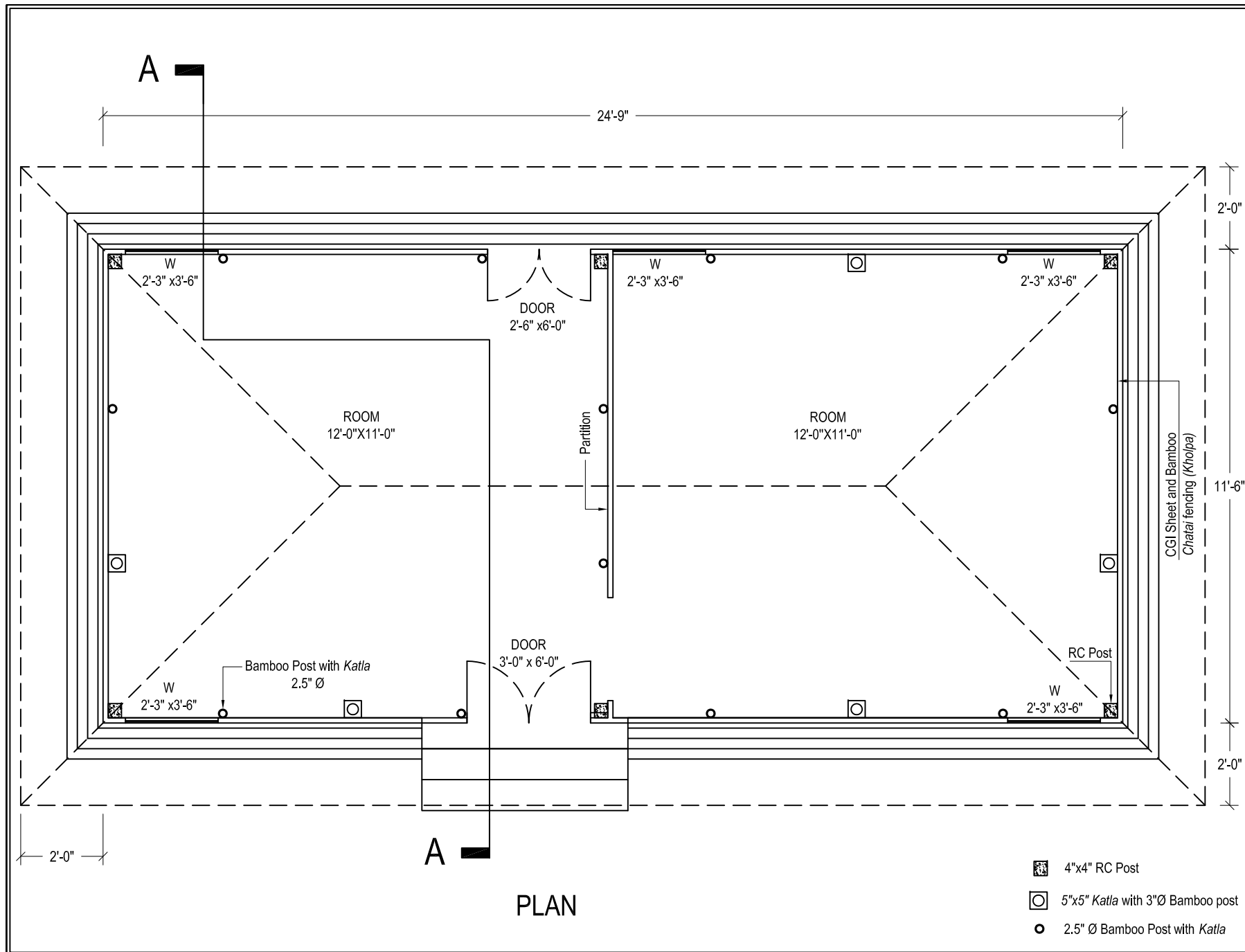
Roof cover: CGI sheets






Roof structure: Wooden truss

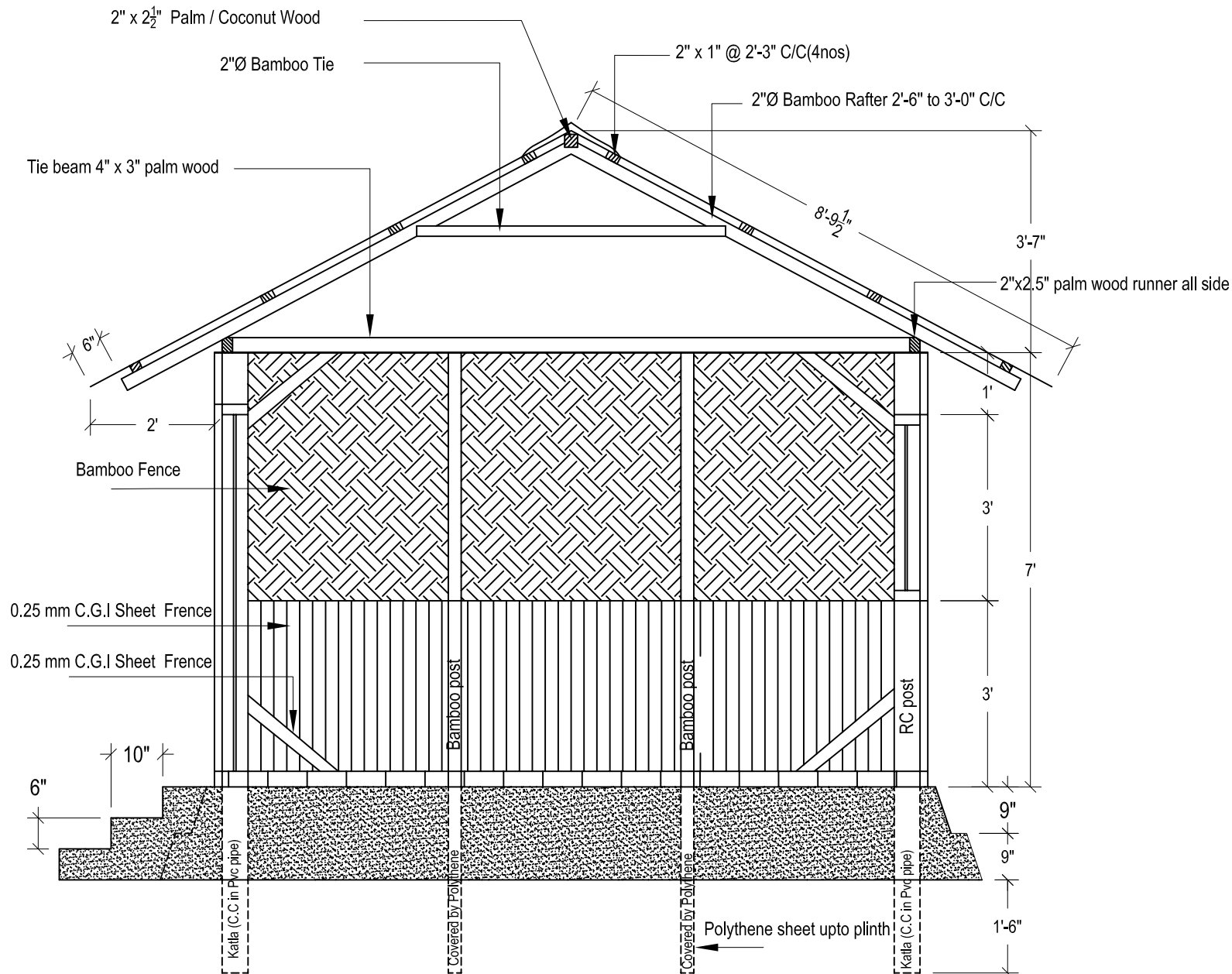
Bracing: Corner bracing

Joints: Nails, notches, GI wire






Cost: Tk. 85,000

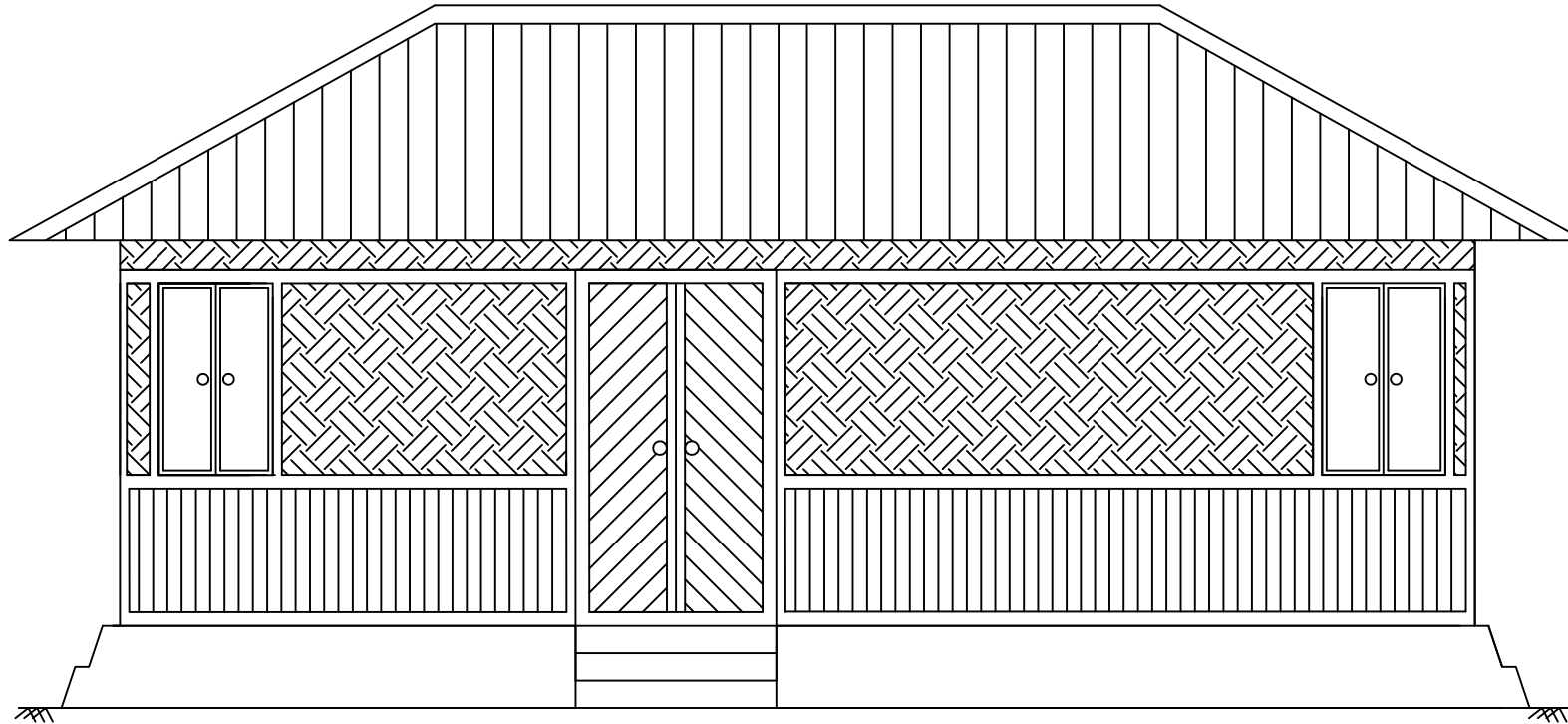


<b>PROJECT NAME :</b>	
<b>CONSTRUCTION OF PILOT LOW COST HOUSES (LCH)</b>	
<b>LOCATION:</b> PUTHIA, RAJSHAHI	
<b>TYPE DP-3 :</b> CGI Sheet with Double Fence	
<b>CONSULTANTS</b>	
 DEPARTMENT OF CIVIL ENGINEERING, BRTC, BUET, DHAKA BANGLADESH	 ENSAG-CRAtterre Grenoble , France
<b>DESIGN BY:</b>	
<b>BUET</b> 1. Prof. Dr. Tahsin Reza Hossain 2. Prof. Dr. Mohammad Shariful Islam  <b>CRAtterre</b> 3. Engr. Olivier Moles  <b>Caritas, Bangladesh</b> 1. Mr. Ratan Kumar Podder	
<b>DRAWN BY :</b>	
MD, ABU SAYED RASHED	
<b>CLIENT</b>	<b>FUNDING AGENCIES</b>
 CARITAS BANGLADESH	 CARITAS FRANCE   CARITAS LUXEMBOURG
<b>DRAWING TITLE:</b>	
PLAN	
JULY, 2015	<b>SHEET NO:</b> S - 01



SECTION: A - A

<b>PROJECT NAME :</b>	
<b>CONSTRUCTION OF PILOT LOW COST HOUSES (LCH)</b>	
<b>LOCATION:</b> PUTHIA, RAJSHAHI	
<b>TYPE DP-3 :</b> CGI Sheet with Double Fence	
<b>CONSULTANTS</b>	
 DEPARTMENT OF CIVIL ENGINEERING, BRTC, BUET, DHAKA BANGLADESH	 ENSAG-CRATERRE Grenoble , France
<b>DESIGN BY:</b>	
BUET 1. Prof. Dr. Tahsin Reza Hossain 2. Prof. Dr. Mohammad Shariful Islam  CRATERRE 3. Engr. Olivier Moles  Caritas, Bangladesh 1. Mr. Ratan Kumar Podder	
<b>DRAWN BY :</b>	
MD. ABU SAYED RASHED	
<b>CLIENT</b>	<b>FUNDING AGENCIES</b>
 CARITAS BANGLADESH	 CARITAS FRANCE   CARITAS LUXEMBOURG
<b>DRAWING TITLE:</b>	
<b>SECTION: A - A</b>	
JULY, 2015	<b>SHEET NO:</b> S - 02



FRONT ELEVATION

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: PUTHIA, RAJSHAHI

TYPE DP-3 : CGI Sheet with Double Fence

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY :

BUET

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2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

MD. ABU SAYED RASHED

CLIENT

CARITAS  
BANGLADESH

FUNDING AGENCIES



CARITAS FRANCE

CARITAS  
LUXEMBOURG






DRAWING TITLE:

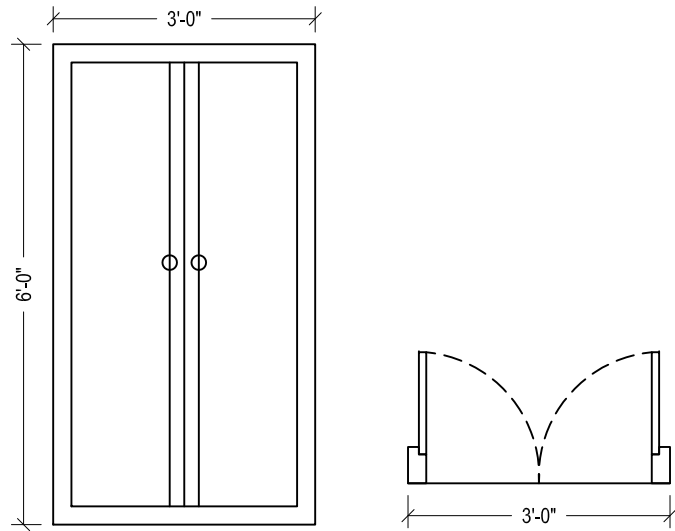
FRONT ELEVATION

JULY, 2015

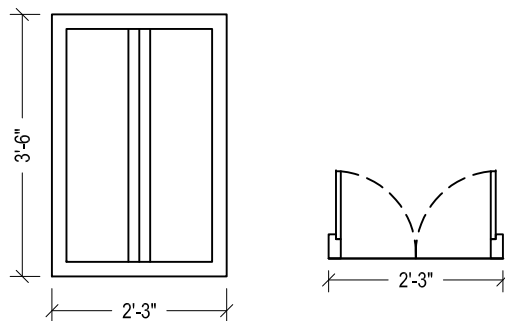
SHEET NO:

S - 03

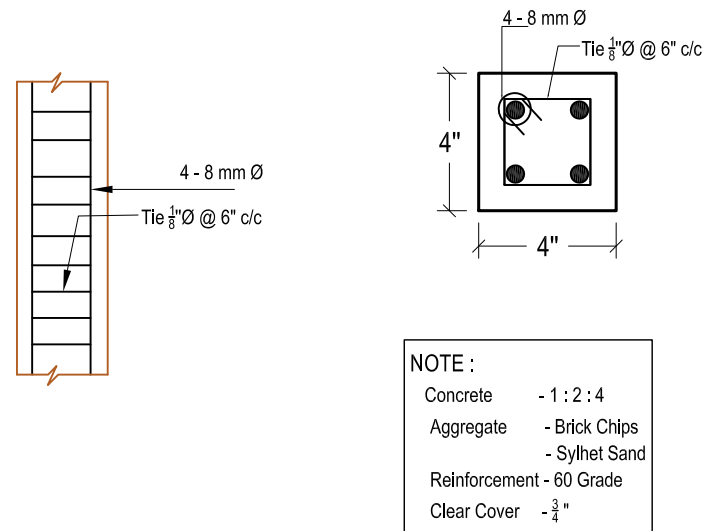
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		<p>DRAWN BY :</p> <p>Md. ABU SAYED RASHED</p> <p>CLIENT</p> <p>FUNDING AGENCIES</p> <div>  <p>CARITAS BANGLADESH</p> </div> <div>  <p>Caritas France Secours Catholique CARITAS FRANCE</p> </div> <div>  <p>caritas LUXEMBOURG</p> </div> <p>DRAWING TITLE:</p> <p>DETAILS</p>
<p>Detail 02: Plinth</p>	<p>Detail 04: Corner Bracing</p>	<p>JULY, 2015</p> <p>SHEET NO:</p> <p>S - 04</p>



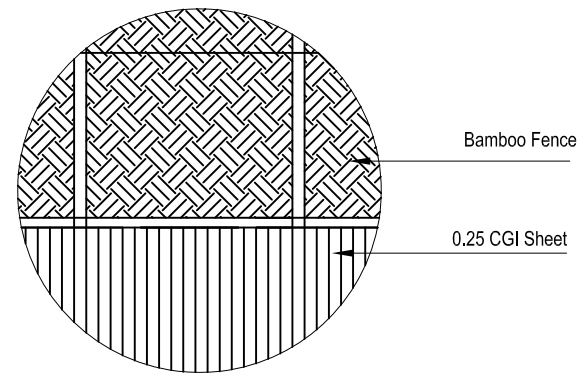
Detail 05: Door



Detail 06: Window



Detail 07: RC Post (Long Section &amp; Cross Section)



Detail 08: CGI Sheet &amp; Bamboo Fence Joint

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: PUTHIA, RAJSHAHI

TYPE DP-3 : CGI Sheet with Double Fence

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRaterre  
Grenoble , France

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CRATERRE

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CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

DETAILS

JULY, 2015

SHEET NO:

S - 05



MEMBER SCHEDULE				
SL.	ITEMS NAME	DIMENSIONS	MATERIALS NAME	REMARKS
1.	Roof Cover	0.32 mm	CGI Sheet	
2.	Purlin (Top)	2.5"X2.5"	Palm/Coconut wood	
3.	Purlin	2"X1"	Timber	@ 2'-3" C/C
4.	Rafter	2" dia	Bamboo	
5.	Corner Rafter	2"x2.5"	Timber	
6.	Tie Beam	2" dia	Bamboo	
8.	Roof Beam	4"X3"	Palm wood	@ 4'-0" C/C (Alternate)
9.	Wall Plate	2"x2.5"	Palm wood	
10.	Corner Bracing	2.5"x3"	Bamboo	Both top and bottom
11.	Fance (Upper Part)		Bamboo mat	4' height
12.	Fance (Bottom Part)	0.25mm	CGI Sheet	3' height
13.	Interior Post	3" dia	Bamboo	With <i>Katla</i>
14.	Corner Post	4"x4"x10'-0"	R C	4-8 mm Ø 1:2:4 Concrete
15.	Fance Supporting Post	2" dia	Bamboo	Without <i>Katla</i>
16.	Door	3'-0"x6'-0"	Timber	Position may be changed
17.	Window	2'-3"x3"-0"	Mud	Position may be changed

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: PUTHIA, RAJSHAHI

TYPE DP-3 : CGI Sheet with Double Fence

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

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2. Prof. Dr. Mohammad Shariful Islam

CRAAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXENBOURG

DRAWING TITLE:

MEMBER SCHEDULE

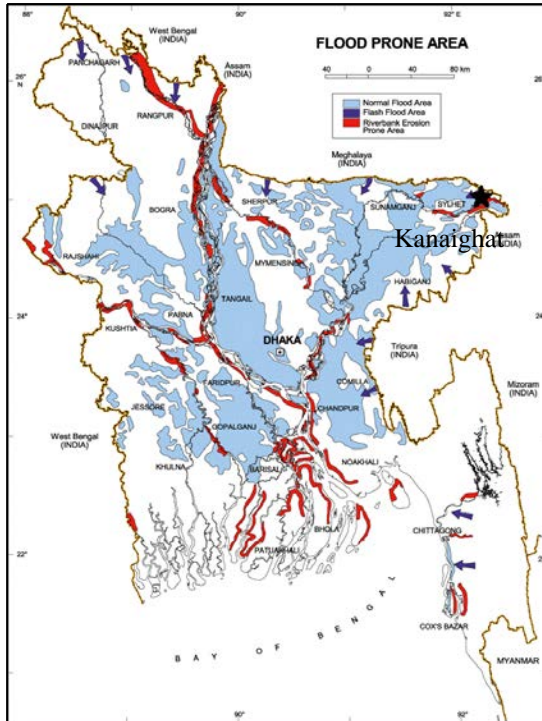
JULY, 2015

SHEET NO:

S - 06

## DIVISION: SYLHET

### 20. DESIGN OF LCH IN KANAIGHAT: TYPE – 1.1



#### SITE TOPOGRAPHY



#### General Information:

##### Location:

District: Sylhet  
Upazila: Kanaighat  
Union: Lauxmiprasad  
Mouza/ Village: Ujanparabait

##### Climatic Feature:

Avg. Maximum Temperature: 33 °C  
Avg. Minimum temperature: 14°C  
Annual Rainfall: 3334 mm  
Average Relative Humidity: 73%

##### Geotechnical Feature:

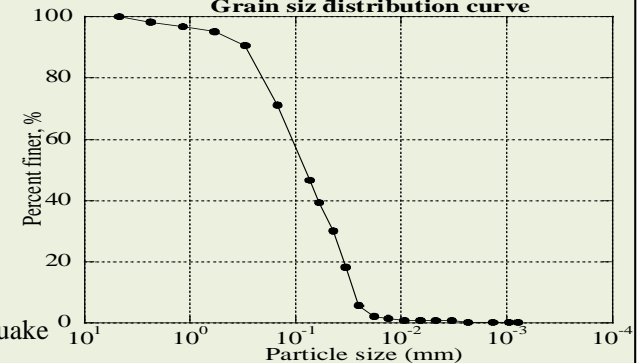
Topography: Plain land  
MSL: 11 m  
Soil Characteristics: Silt

##### Disaster:

Flood, river bank erosion, northwester, earth quake



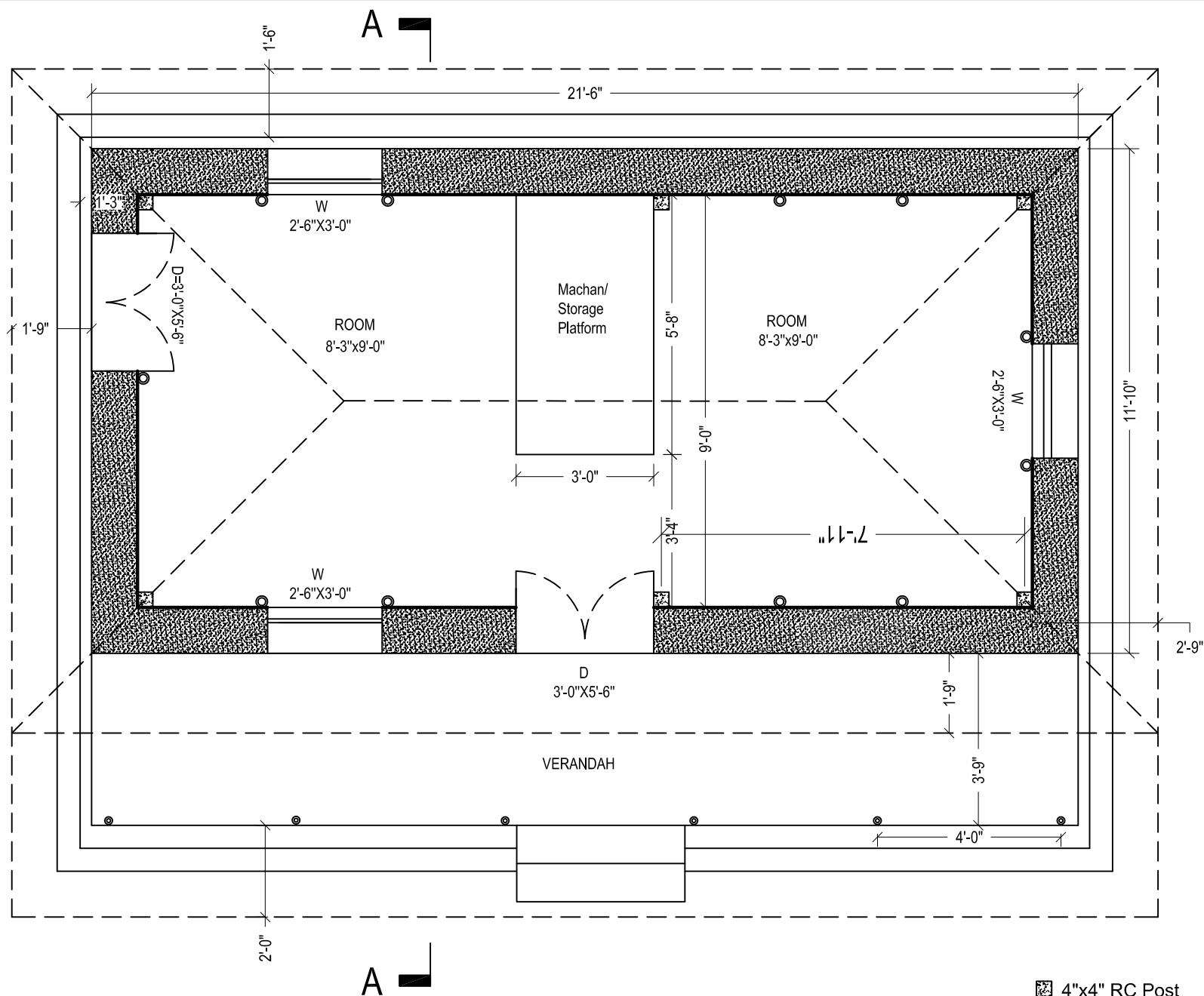
Completed House  
Grain siz distribution curve



#### Design Considerations:

Available Building Materials: Mud, Bamboo, Timber etc  
Foundation: Stone  
Plinth: Stone (main house) & mud (veranda)  
Post: RC and bamboo posts with *katla*/without *katla*  
Fence/Wall: Mud and *Ikar*  
Openings: 1 main door + 1 inside door to connect rooms  
Ceiling: Ceiling is considered to protect heat and cold  
Rain water harvesting system

Roof Type: Four pitched  
Roof cover: CGI sheets  
Roof structure: Wooden truss  
Bracing: Corner bracing  
Joints: Nails, notches, GI wire  
Cost: Tk. 1,30,000



PLAN

4"x4" RC Post

3"Ø Bamboo post

2"Ø Bamboo post

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: KANAIGHAT, SYLHET

TYPE 1.1 :  
Ikar Fence with Stone Plinth House

CONSULTANTS



DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESH



ENSAG-CRATERRE  
Grenoble, France

DESIGN BY:

BUET

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2. Prof. Dr. Mohammad Shariful Islam

CRATERRE

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

MD. ABU SAYED RASHED

CLIENT



CARITAS  
BANGLADESH

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CARITAS FRANCE



CARITAS  
LUXEMBOURG

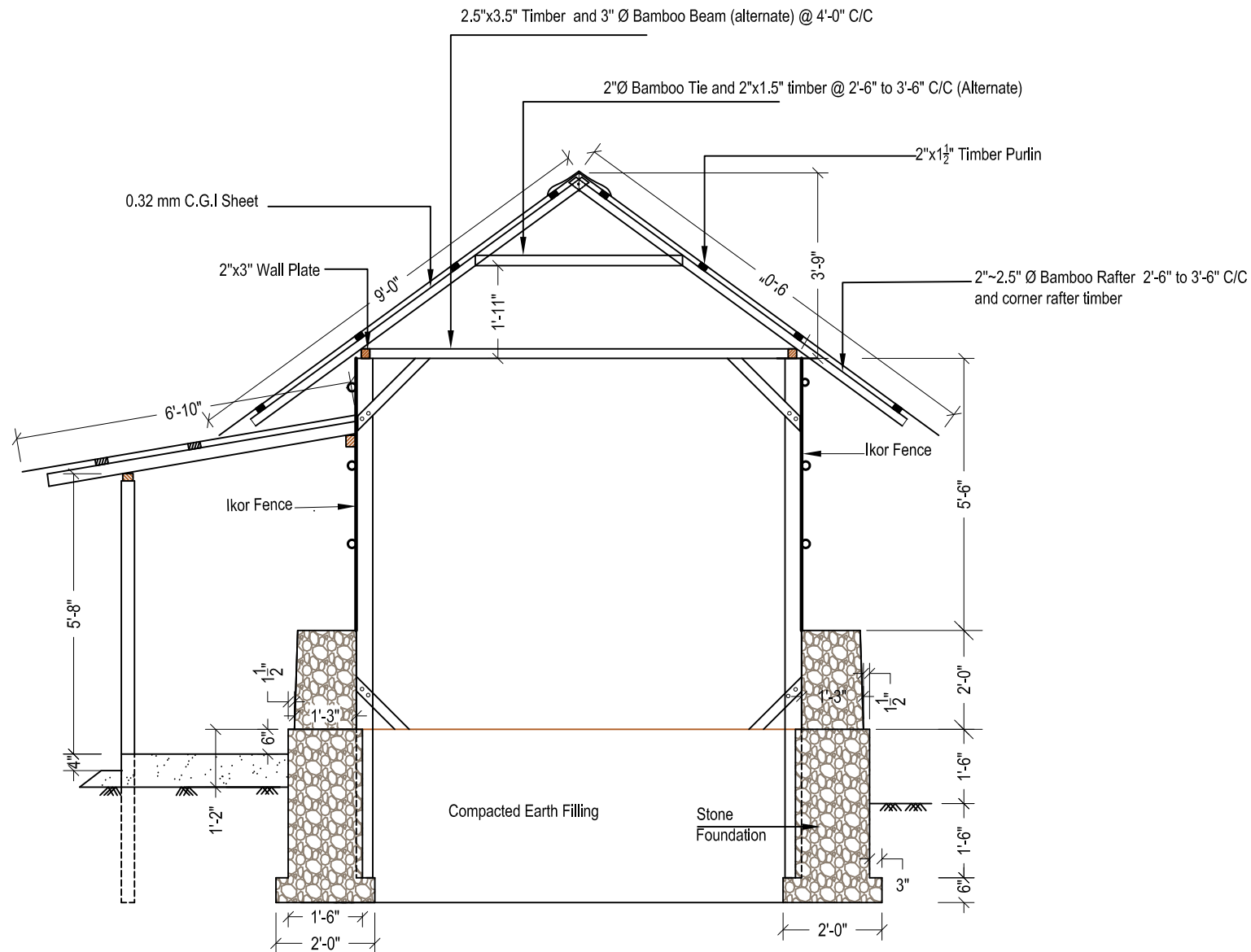
DRAWING TITLE:

PLAN

JULY, 2015

SHEET NO:

S - 01



SECTION: A - A

**PROJECT NAME :**

### CONSTRUCTION OF PILOT LOW COST HOUSES (LCH)

LOCATION: KANAIGHAT, SYLHET

TYPE 1.1:  
*Ikar Fence with Stone Plinth House*

CONSULTANTS



DEPARTMENT OF CIVIL ENGINEERING, BRTC, BUET,DHAKA BANGLADESH	ENSAG-CRAterre Grenoble , France
---	-------------------------------------

DESIGN BY:

**BUET**  
1. Prof. Dr. Tahsin Reza Hossain  
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CRAterre  
3. Engr. Olivier Moles

Caritas, Bangladesh  
1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT



CARITAS  
BANGLADESH

FUNDING AGENCIES
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CARITAS FRANCE



CARITAS  
LUXEMBOURG

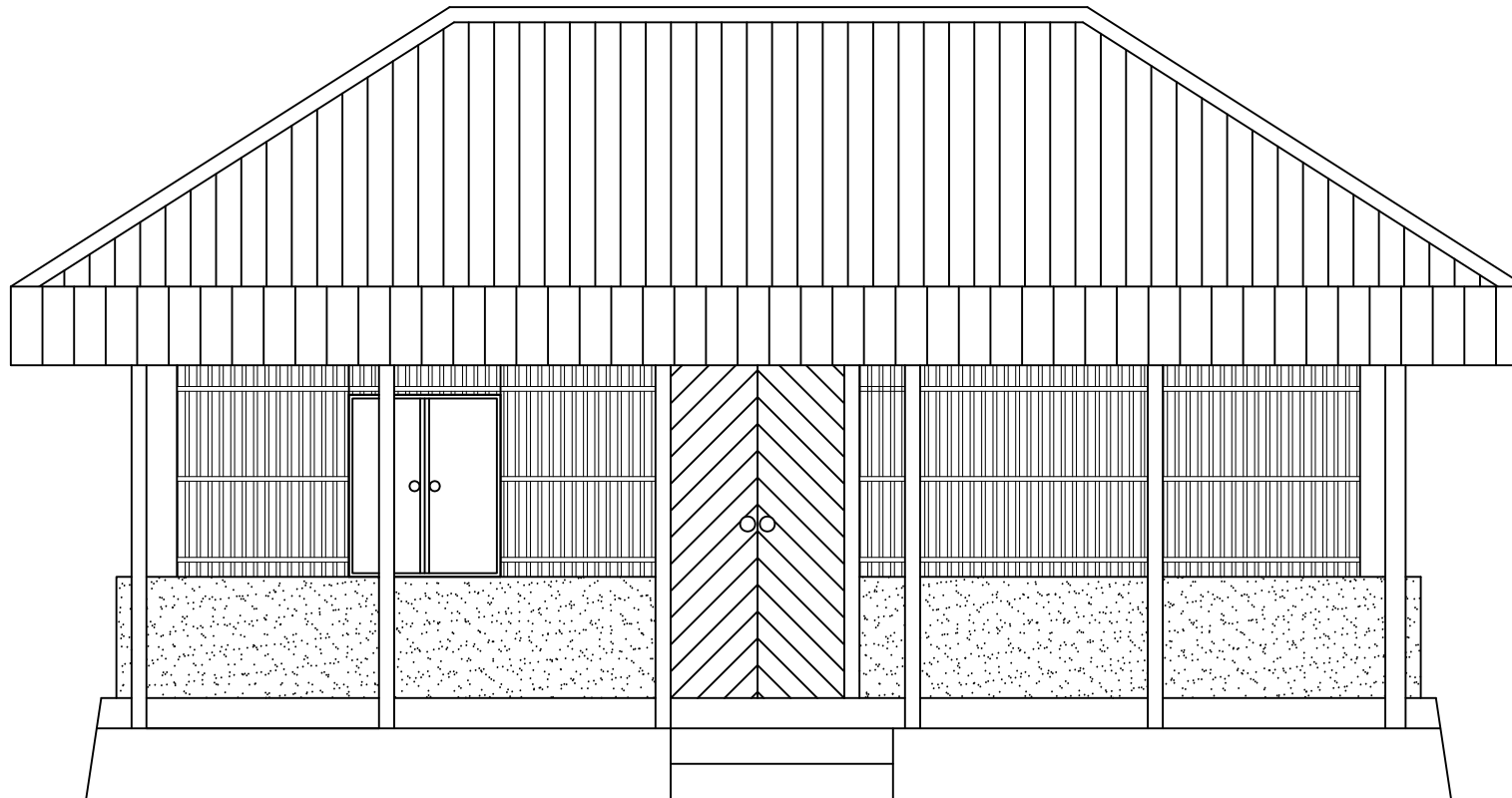
DRAWING TITLE:

SECTION: A - A

JULY, 2015

SHEET NO:

S - 02



FRONT ELEVATION

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: KANAIGHAT, SYLHET

TYPE 1.1 :  
Ikar Fence with Stone Plinth House

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAtterre  
Grenoble , France

DESIGN BY:

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CRAtterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

MD. ABU SAYED RASHED

CLIENT

CARITAS  
BANGLADESH

FUNDING AGENCIES



CARITAS FRANCE

CARITAS  
LUXEMBOURG

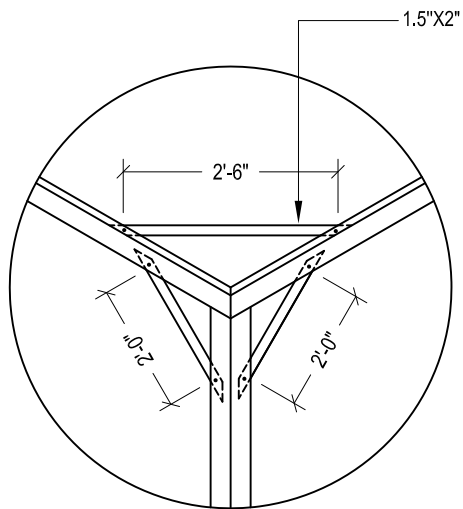
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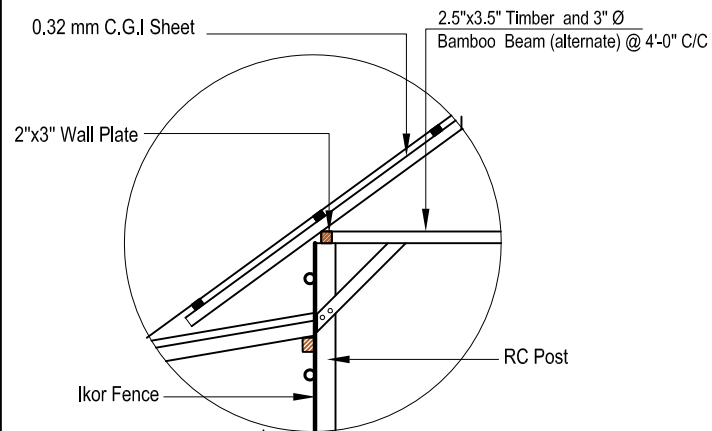
JULY, 2015

SHEET NO:

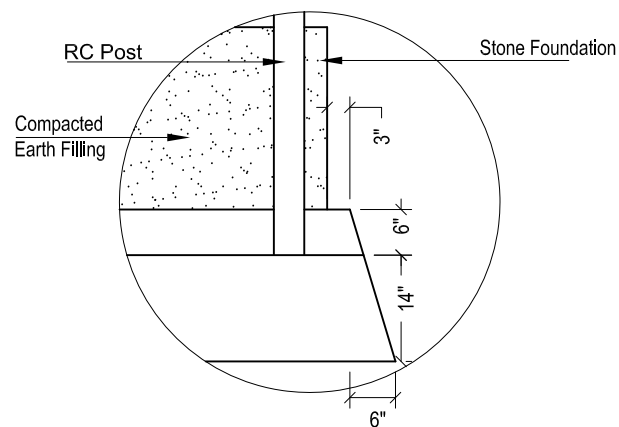
S - 03



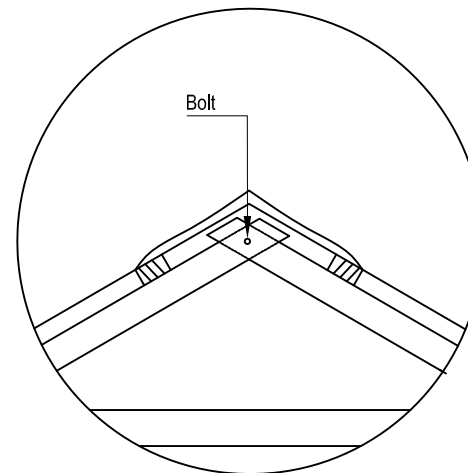
Detail 01: Corner Bracing



Detail 03: Corner Bracing and Roof Arrangement



Detail 02: Plinth



Detail 04: Roof Top

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: KANAIGHAT, SYLHET

TYPE 1.1 :  
Ikar Fence with Stone Plinth House

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

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CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

MD. ABU SAYED RASHED

CLIENT

CARITAS  
BANGLADESH

FUNDING AGENCIES



CARITAS FRANCE

CARITAS  
LUXEMBOURG

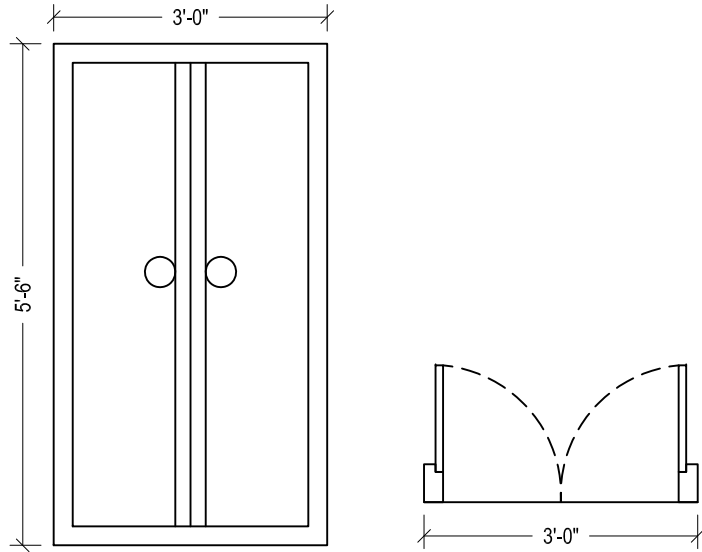
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DETAIL

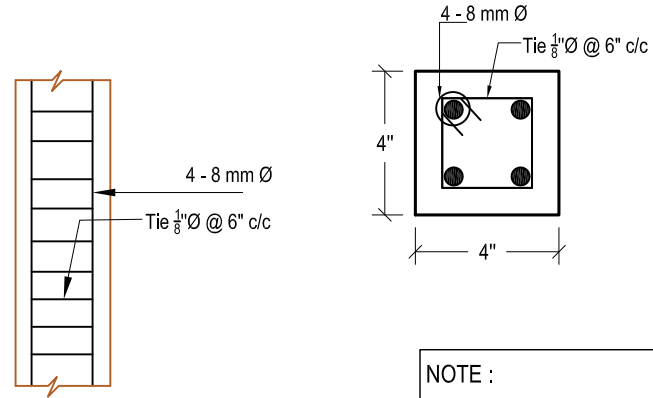
JULY, 2015

SHEET NO:

S - 04



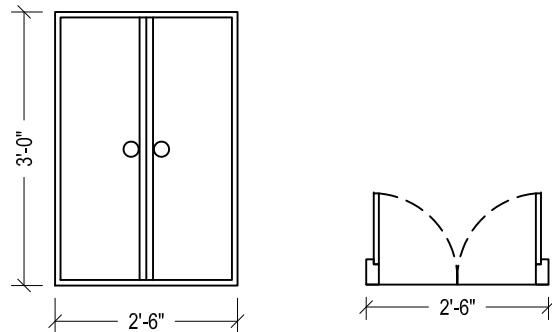
Detail 05: Door



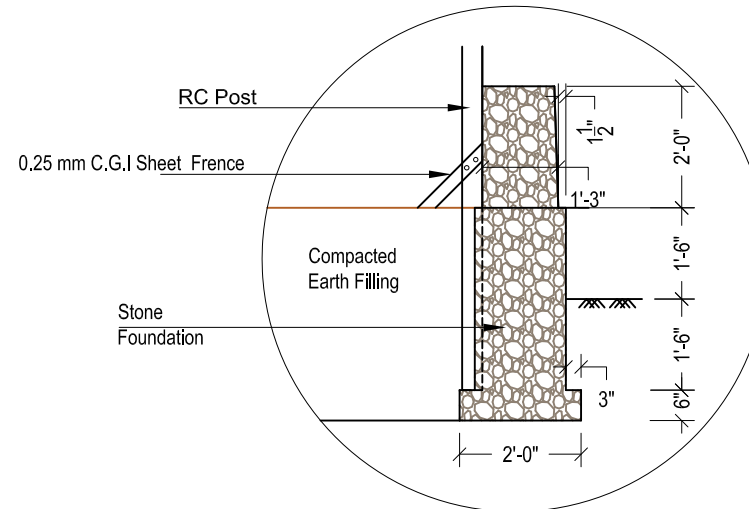
## NOTE :

Concrete - 1 : 2 : 4  
 Aggregate - Brick Chips  
 - Sylhet Sand  
 Reinforcement - 60 Grade  
 Clear Cover -  $\frac{3}{4}$ "

Detail 07: RC Post(Long Section &amp; Cross Section)



Detail 06: Window



Detail 08: Stone Foundation

## PROJECT NAME :

CONSTRUCTION OF PILOT  
 LOW COST HOUSES (LCH)

LOCATION: KANAIGHAT, SYLHET

TYPE 1.1 :

Ikar Fence with Stone Plinth House

## CONSULTANTS



DEPARTMENT OF  
 CIVIL ENGINEERING,  
 BRTC, BUET, DHAKA  
 BANGLADESH



ENSAG-CRATERRE  
 Grenoble, France

## DESIGN BY:

BUET

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 2. Prof. Dr. Mohammad Shariful Islam

CRATERRE

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

## DRAWN BY :

MD. ABU SAYED RASHED

## CLIENT



CARITAS  
 BANGLADESH

## FUNDING AGENCIES



CARITAS FRANCE



CARITAS  
 LUXEMBOURG

## DRAWING TITLE:

DETAIL

JULY, 2015

SHEET NO:

S - 05



MEMBER SCHEDULE				
SL.	ITEMS NAME	DIMENSIONS	MATERIALS NAME	REMARKS
1.	Roof Cover	0.32 mm	CGI Sheet	
2.	Purlin	2"x1.5"	Timber	@ 2'-6" C/C
3.	Rafter	2"x2.5"	Timber	@ 2'-6" to 3'-6"C/C
4.	Corner Rafter	2"x2.5"	Timber	
5.	Tie	2"x1.5" timber & 2"dia bamboo	Timber & Bamboo	@ 2'-6" to 3'-6"C/C
6.	Roof Beam	2.5"x3.5" timber & 3"dia bamboo	Timber & Bamboo	@ 4'-0" C/C (Alternate)
7.	Wall Plate	2"x3"	Timber	
8.	Corner Bracing	2"x2.5"	Timber	Both top and bottom
9.	Ikor Fance (Top)		<i>Ikar</i>	4' height
10.	Stone Wall (Bottom)	1'-3"	Stont with Mud mortar	
11.	Post (Veranda)	2" dia	Bamboo	With <i>Katla</i>
12.	Foundation & Plinth	3'-6" Depth	Stont with Mud mortar	4-8 mm Ø 1:2:4 Concrete
13.	Corner Post	4"x4"x11'-0"	RCC (4-10 mm Steel)	Ratio=1:2:4
14.	Door	3'-0"x5'-6"	Timber	Position may be changed
15.	Window	2'-6"x3'-0"	Timber	Position may be changed

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: KANAIGHAT, SYLHET

TYPE 1.1 :

*Ikar* Fence with Stone Plinth House

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain  
2. Prof. Dr. Mohammad Shariful Islam

CRAAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXENBOURG

DRAWING TITLE:

MEMBER SCHEDULE

JULY, 2015

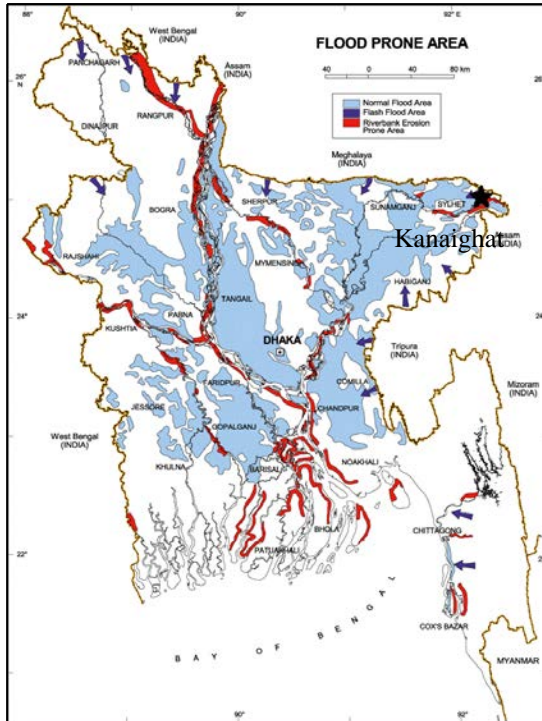
SHEET NO:

S - 06



## DIVISION: SYLHET

### 21. DESIGN OF LCH IN KANAIGHAT: TYPE – 2.1



#### SITE TOPOGRAPHY



#### General Information:

##### Location:

District: Sylhet  
Upazila: Kanaighat  
Union: Lauxmiprasad  
Mouza/ Village: Monipur

##### Climatic Feature: Dry

Avg. Maximum Temperature: 33 °C  
Avg. Minimum temperature: 14°C  
Annual Rainfall: 3334 mm  
Average Relative Humidity: 73%

##### Geotechnical Feature:

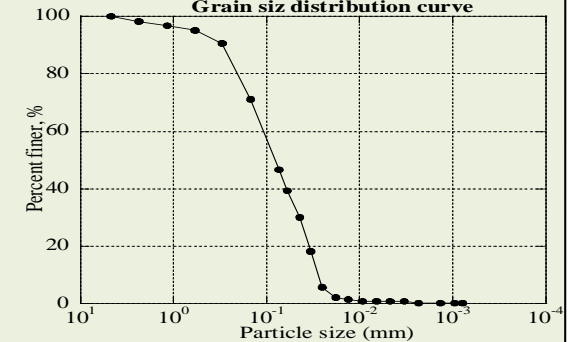
Topography: Plain land  
MSL: 11 m  
Soil Characteristics: Silt

##### Disaster:

Flood, river bank erosion, northwester, earthquake



**Completed House**  
Grain size distribution curve



#### Design Considerations:

Available Building Materials: Mud, Bamboo, Timber etc  
Foundation: Bamboo posts/ *katla* embedded in soil (1-2 ft)  
Plinth: Mud  
Post: RC and bamboo posts with *katla*/without *katla*  
Fence/Wall: Bamboo mat over CGI sheet  
Openings: 1 main door + 1 inside door to connect rooms  
Ceiling: Ceiling is considered to protect heat and cold  
Rain water harvesting system  
Treatment (bamboo & wood): Water treatment & partial chemical treatment

Roof Type: Four pitched & veranda  
roof is disconnected from main roof  
Roof cover: CGI sheets  
Roof structure: Wooden truss  
Bracing: Corner bracing  
Joints: Nails, notches, GI wire  
Cost: Tk. 90,000

PROJECT NAME :

### CONSTRUCTION OF PILOT LOW COST HOUSES (LCH)

LOCATION: KANAIGHAT, SYLHET

TYPE 2.1 : IKOR FENCE WITH MUD PLASTER

CONSULTANTS



DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

- ### 3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES
------------------



CARITAS FRANCE

CARITAS  
LUXEMBOURG

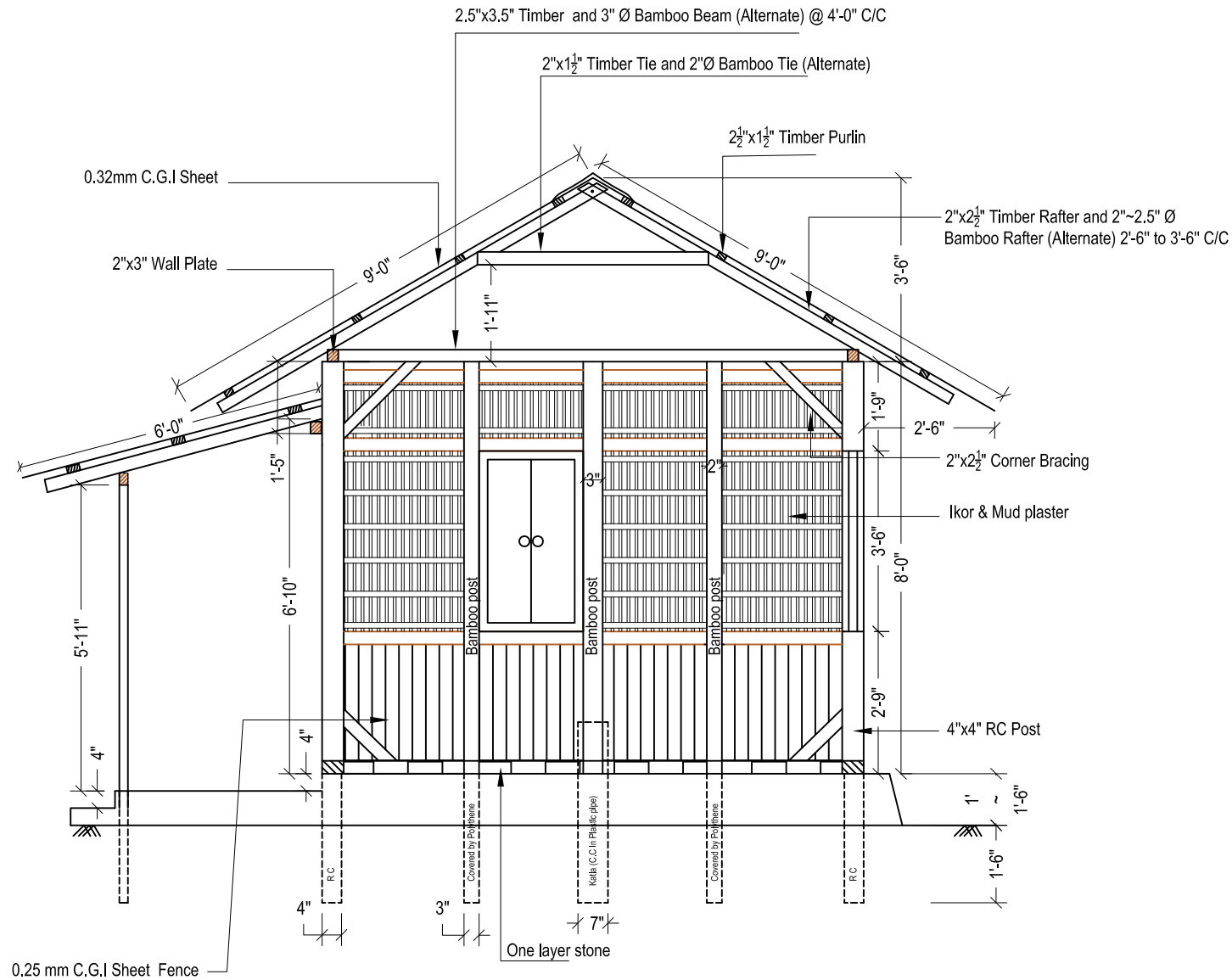
DRAWING TITLE:

## PLAN

JULY, 2015

SHEET NO:

S - 01



SECTION: A - A

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: KANAIGHAT, SYLHET

TYPE 2.1 : IKOR FENCE WITH MUD PLASTER

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

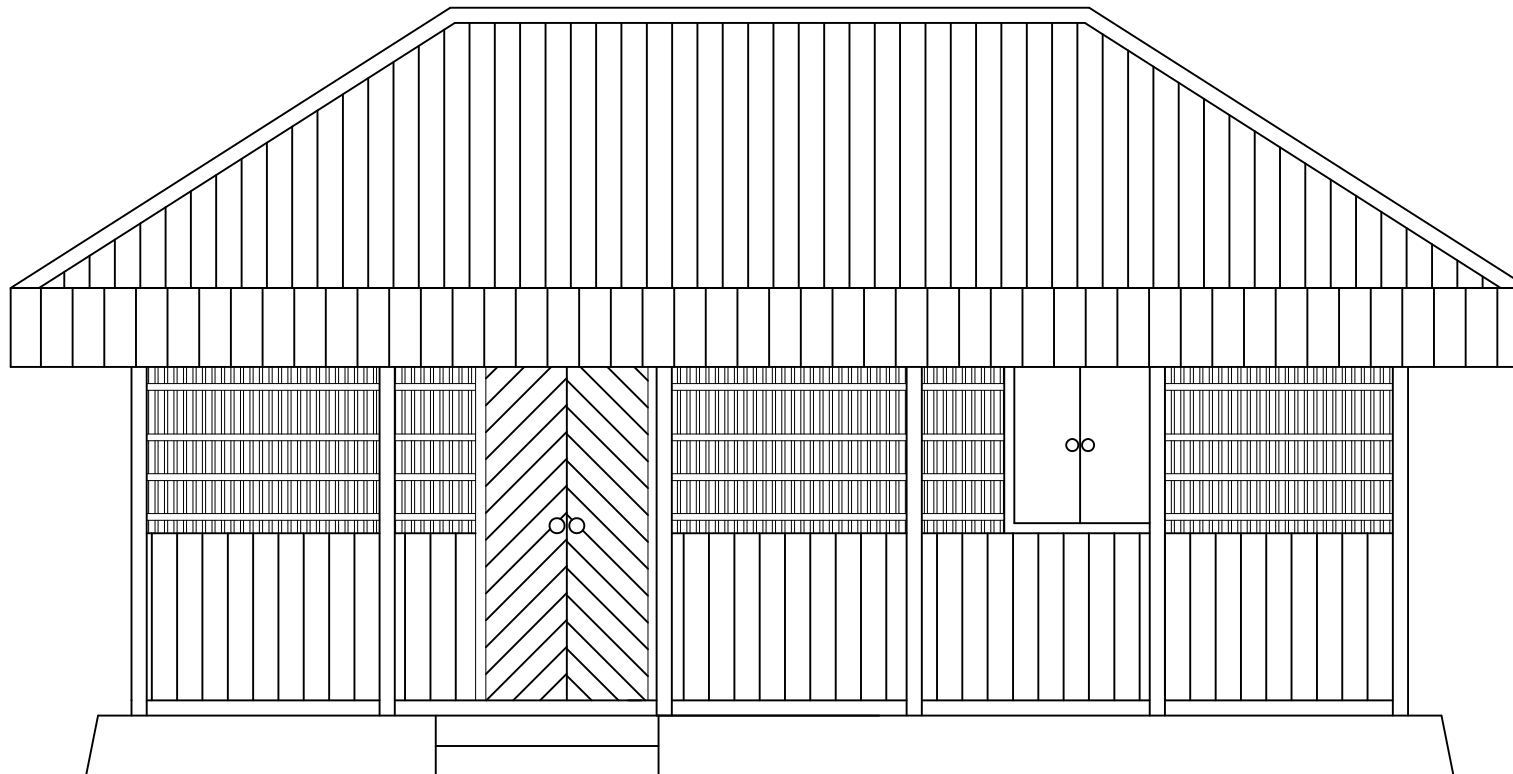
DRAWING TITLE:

SECTION: A - A

JULY, 2015

SHEET NO:

S - 02



FRONT ELEVATION

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: KANAIGHAT, SYLHET

TYPE 2.1 : IKOR FENCE WITH MUD PLASTER

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

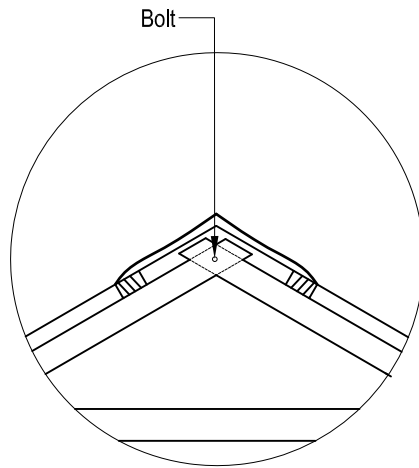
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FRONT ELEVATION

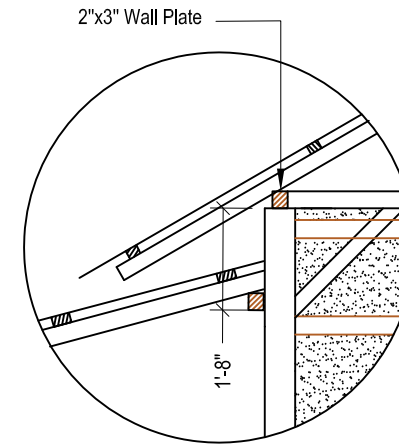
JULY, 2015

SHEET NO:

S - 03



Detail 01: Roof TOP



Detail 03: Corner and roof arrangement

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: KANAIGHAT, SYLHET

TYPE 2.1 : IKOR FENCE WITH MUD PLASTER

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

MD. ABU SAYED RASHED

CLIENT

CARITAS  
BANGLADESH

FUNDING AGENCIES



CARITAS FRANCE

CARITAS  
LUXEMBOURG

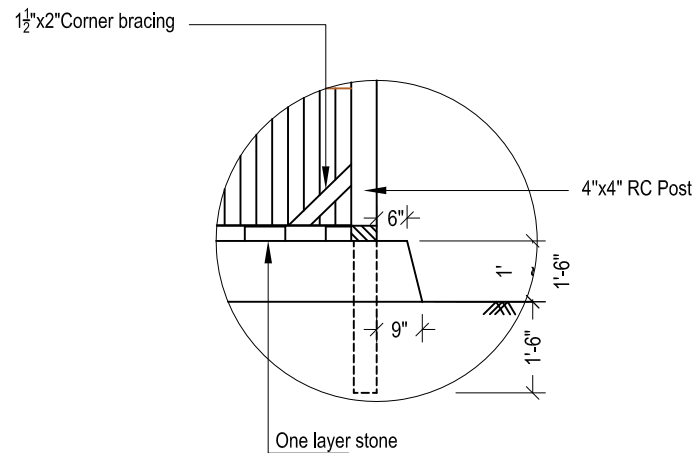
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DETAIL

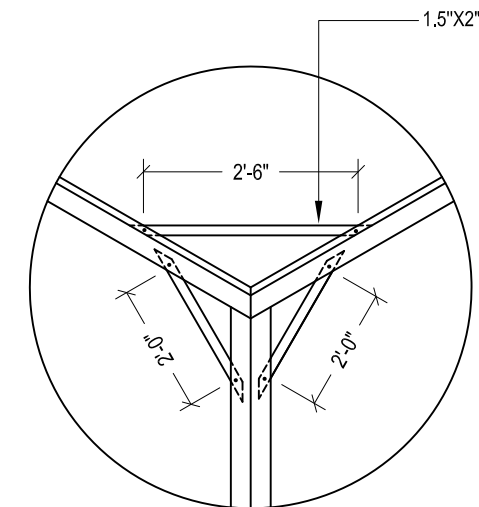
JULY, 2015

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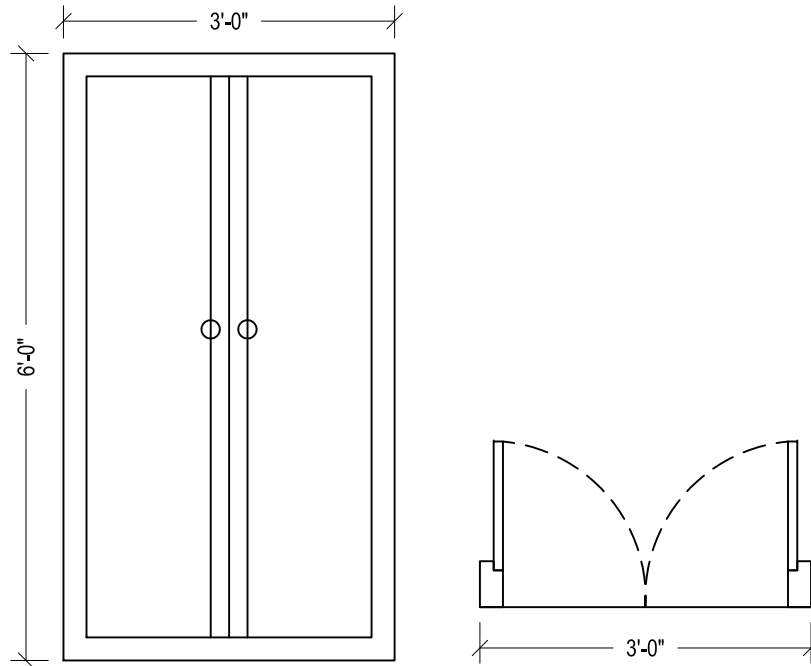
S - 04



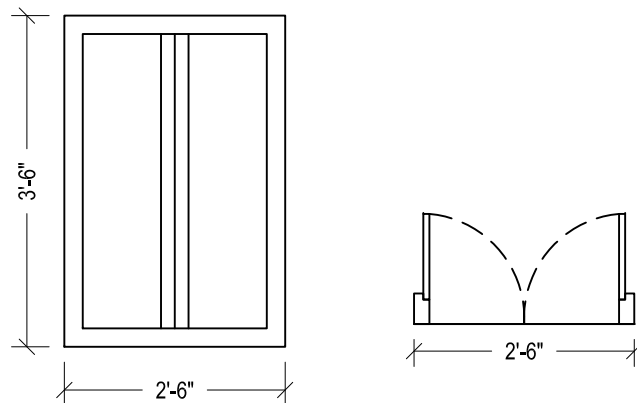
Detail 02: Plinth



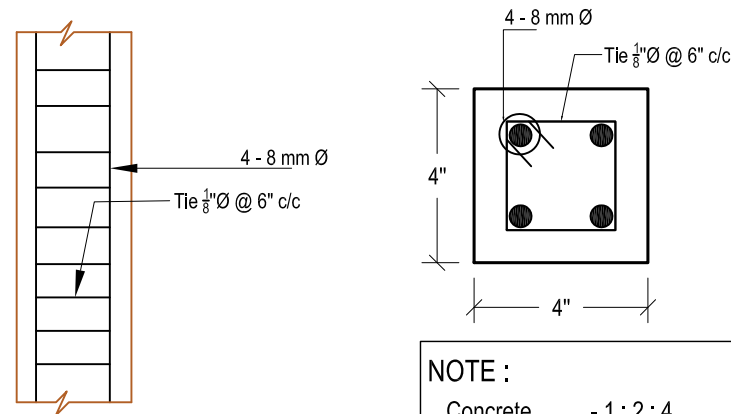
Detail 04: Corner Bracing



Detail 05: Door

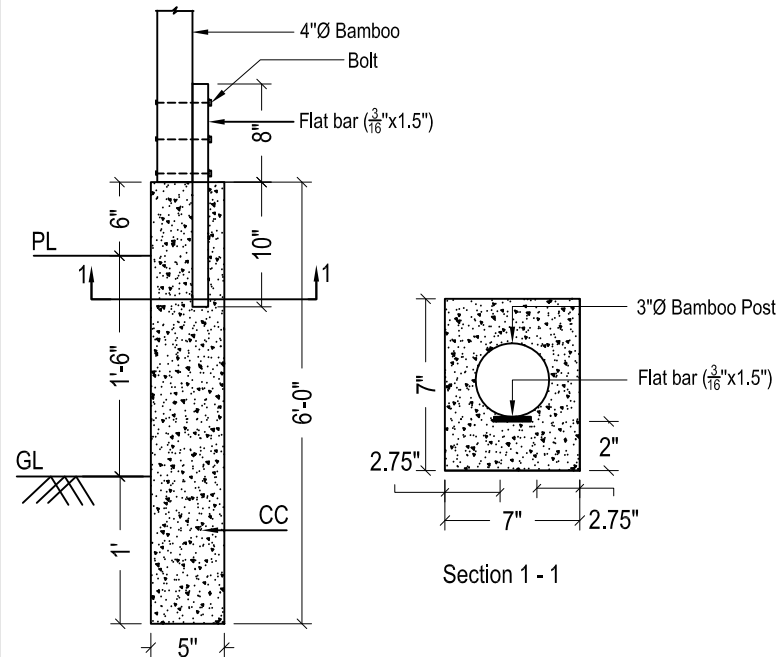


Detail 06: Window

**NOTE :**

Concrete	- 1 : 2 : 4
Aggregate	- Brick Chips - Sylhet Sand
Reinforcement	- 60 Grade
Clear Cover	- $\frac{3}{4}$ "

Detail 07: RC Post(Long Section &amp; Cross Section)



Detail 07: Katla Post (Long Section &amp; Cross Section)

**PROJECT NAME :****CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)**

LOCATION: KANAIGHAT, SYLHET

TYPE 2.1 : IKOR FENCE WITH MUD PLASTER

**CONSULTANTS**DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France**DESIGN BY:**BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

**DRAWN BY :**

MD. ABU SAYED RASHED

**CLIENT**CARITAS  
BANGLADESH**FUNDING AGENCIES**

CARITAS FRANCE

CARITAS  
LUXEMBOURG**DRAWING TITLE:****DETAIL**

JULY, 2015

**SHEET NO:****S - 05**

MEMBER SCHEDULE				
SL.	ITEMS NAME	DIMENSIONS	MATERIALS NAME	REMARKS
1.	Roof Cover	0.32 mm	CGI Sheet	
2.	Purlin	2"x1.5"	Timber	@ 2'-6" C/C
3.	Rafter	2"x2.5" Timber & 2"to2.5" dia bamboo	Timber & Bamboo	@ 2'-6" to 3'-6" C/C (Alternate)
4.	Tie	2"x1.5" Timber & 2" dia bamboo	Timber & Bamboo	
5.	Roof	2.5"x3.5" Timber & 3" dia bamboo	Timber & Bamboo	@ 4'-0" C/C (Alternate)
6.	Wall Plate	2"x3"	Timber	
8.	Corner Bracing	2"x2.5"	Timber	Both top and bottom
9.	Mud & Ikar wall (Top)		Mud & Ikar	
10.	Fance (Bottom)	0.25mm	CGI Sheet	3' height
11.	Interior Post	3" dia	Bamboo	
12.	Corner Post	4"x4"x11'-0"	R C	4-8 mm Ø 1:2:4 Concrete
13.	Fance Supporting Post	2" dia	Bamboo	
14.	Stone Layer	4" thick	Stone	One layer stone over mud plinth
15.	Door	3'-0"x6'-0"	Timber	Position may be changed
16.	Window	2'-6"x3'-6"	Timber	Position may be changed

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: KANAIGHAT, SYLHET

TYPE 2.1 : IKOR FENCE WITH MUD PLASTER

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain  
2. Prof. Dr. Mohammad Shariful Islam

CRAAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXENBOURG

DRAWING TITLE:

MEMBER SCHEDULE

JULY, 2015

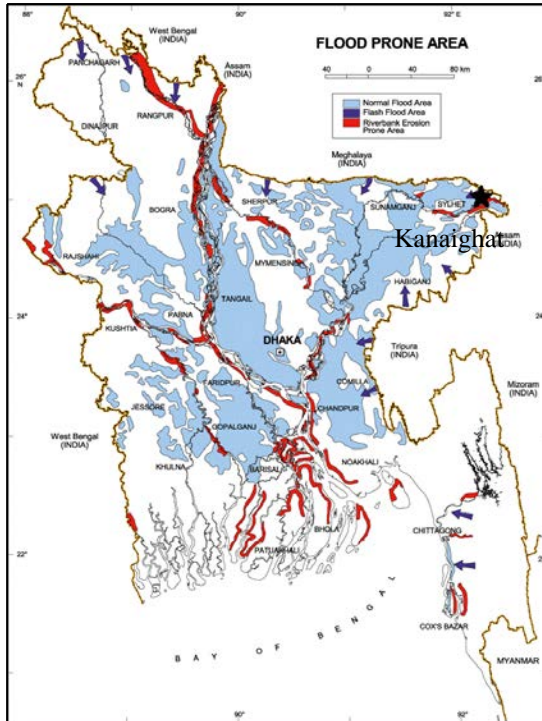
SHEET NO:

S - 06



## DIVISION: SYLHET

### 22. DESIGN OF LCH IN KANAIGHAT: TYPE – 2.2



#### SITE TOPOGRAPHY



#### General Information:

##### Location:

District: Sylhet  
Upazila: Kanaighat  
Union: Lauxmiprasad  
Mouza/ Village: Monipur

##### Climatic Feature:

Avg. Maximum Temperature: 33 °C  
Avg. Minimum temperature: 14°C  
Annual Rainfall: 3334 mm  
Average Relative Humidity: 73%

##### Geotechnical Feature:

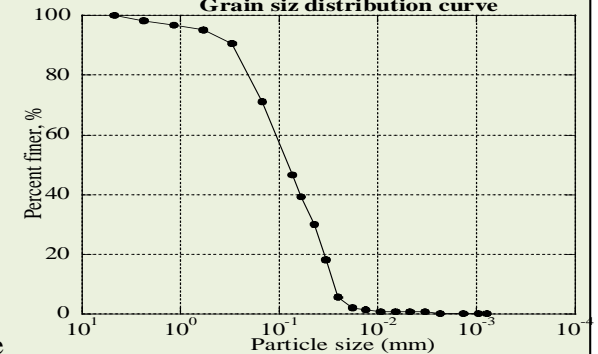
Topography: Plain land  
MSL: 11 m  
Soil Characteristics: Silt

##### Disaster:

Flood, river bank erosion, northwester, earth quake



**Completed House**  
**Grain size distribution curve**



#### Design Considerations:





Available Building Materials: Mud, Bamboo, Timber etc  
Foundation: Bamboo posts/ *katla* embedded in soil (1-2 ft)  
Plinth: Mud (two/three steps)  
Post: RC and bamboo posts with *katla*/without *katla*  
Fence/Wall: Mud and *Ikar*  
Openings: 1 main door + 1 inside door to connect rooms  
Ceiling: Ceiling is considered to protect heat and cold  
Rain water harvesting system  
Treatment (bamboo & wood): Water treatment & partial chemical treatment

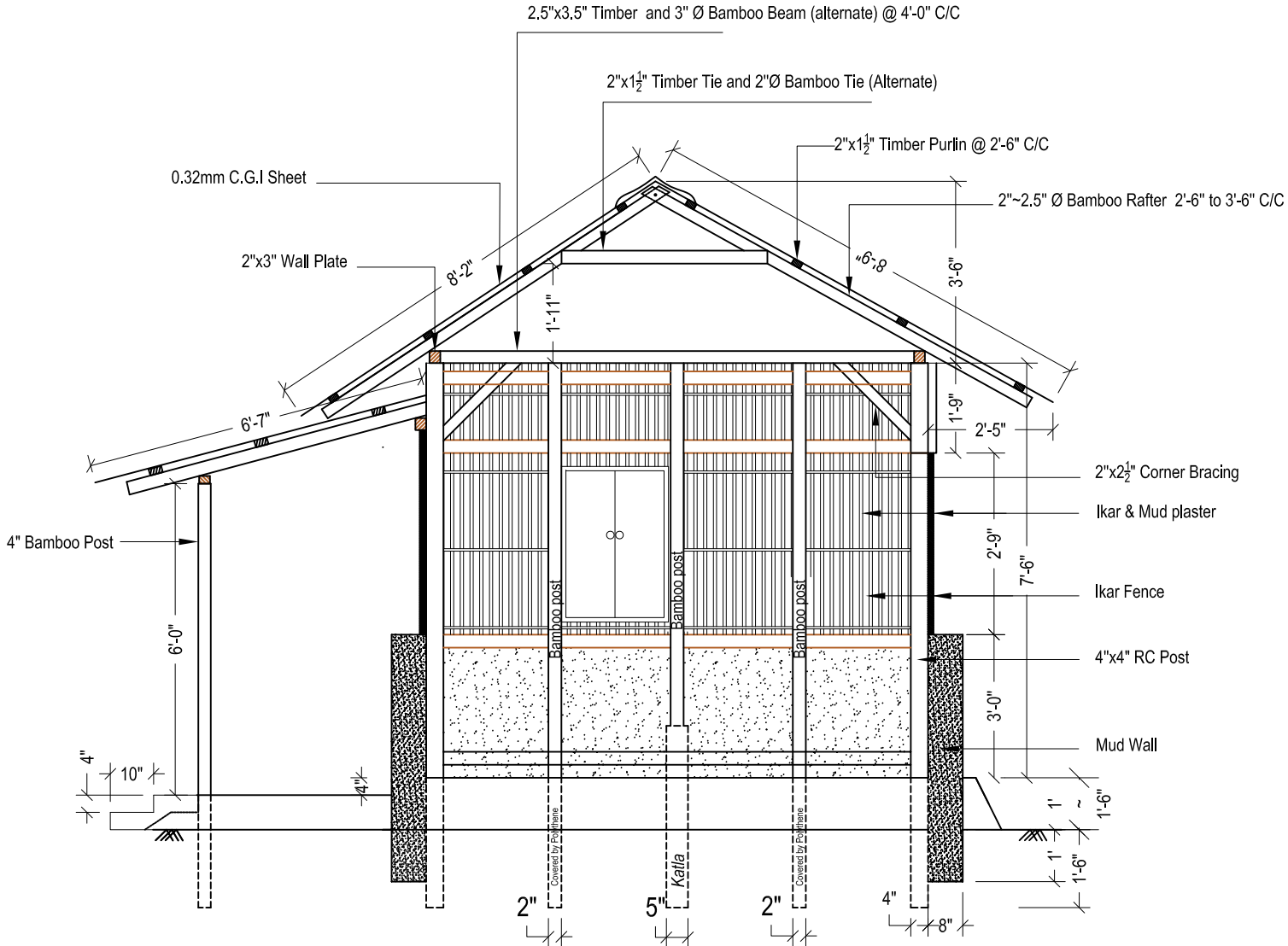
Roof Type: Four pitched & veranda  
roof is disconnected from main roof  
Roof cover: CGI sheets  
Roof structure: Wooden truss  
Bracing: Corner bracing  
Joints: Nails, notches, GI wire  
Cost: Tk. 90,000



## PLAN

S - 01

-  4"x4" RC post
-  3" Ø Bamboo post
-  2" Ø Bamboo post
-  5"x5" *Katla*



SECTION: A - A

**PROJECT NAME :**

### CONSTRUCTION OF PILOT LOW COST HOUSES (LCH)

LOCATION: KANAIGHAT, SYLHET

### TYPE 2.2: MUD WALL AND IKAR FENCE

CONSULTANTS



DEPARTMENT OF CIVIL ENGINEERING, BRTC, BUET, DHAKA BANGLADESH	ENSAG-CRAterre Grenoble , France
--	-------------------------------------

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

- ### 3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT



CARITAS  
BANGLADESH

FUNDING AGENCIES



CARITAS FRANCE



CARITAS  
LUXEMBOURG

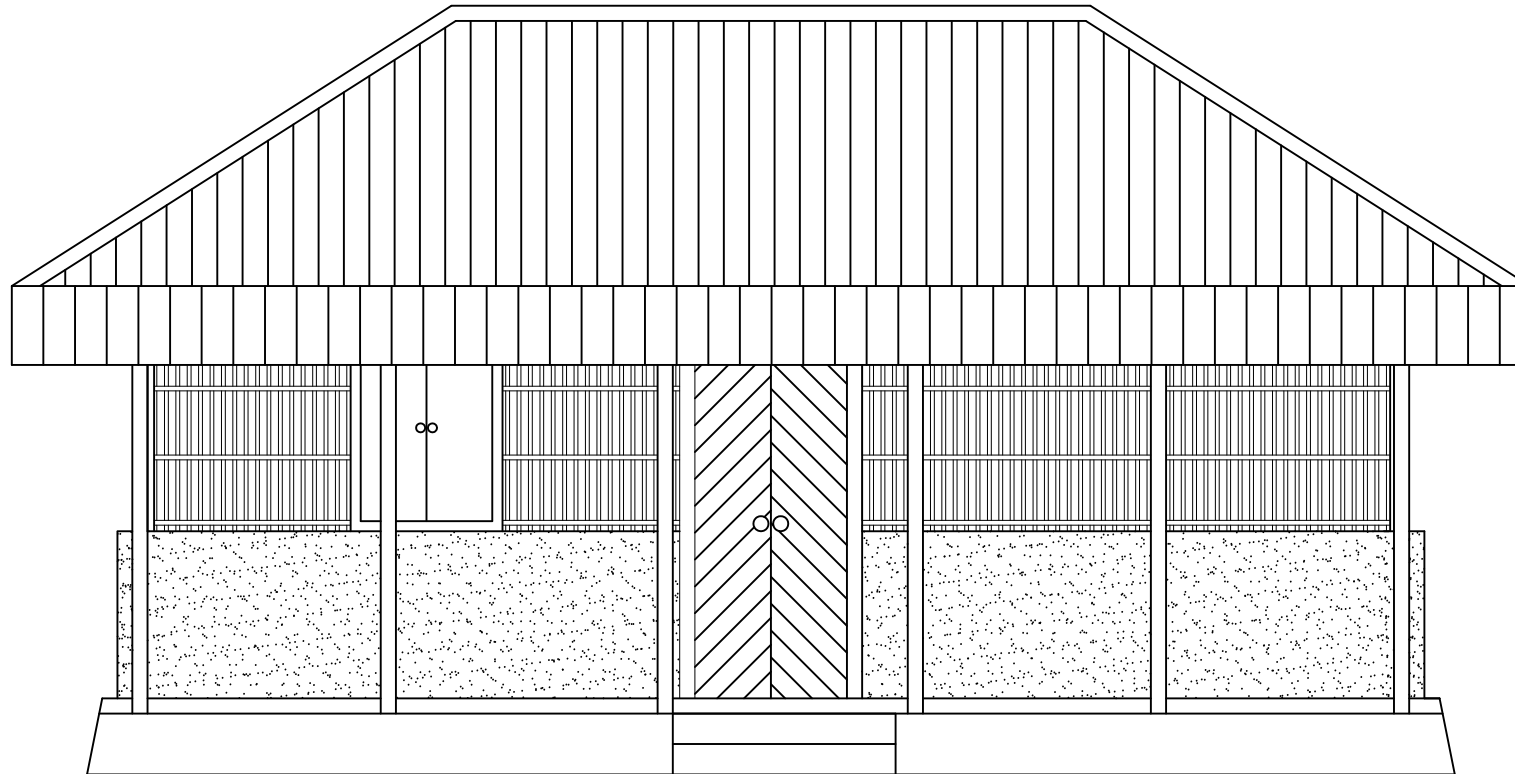
DRAWING TITLE:

SECTION: A - A

JULY, 2015

SHEET NO:

S - 02



FRONT ELEVATION

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: KANAIGHAT, SYLHET

TYPE 2.2 : MUD WALL AND IKAR FENCE

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

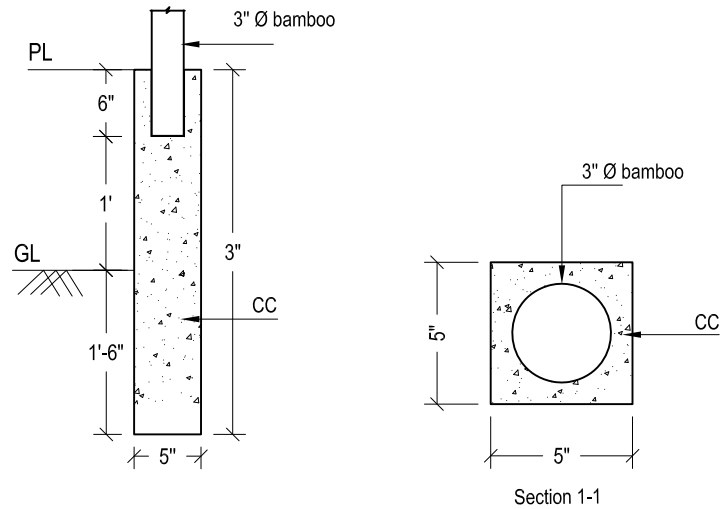
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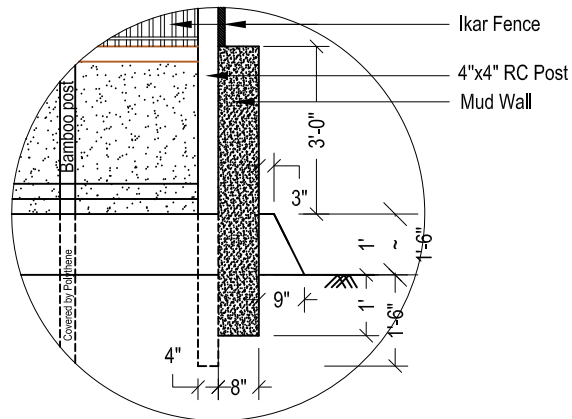
JULY, 2015

SHEET NO:

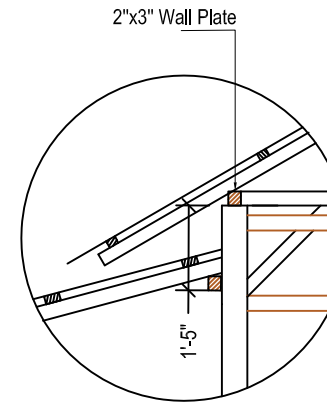
S - 03



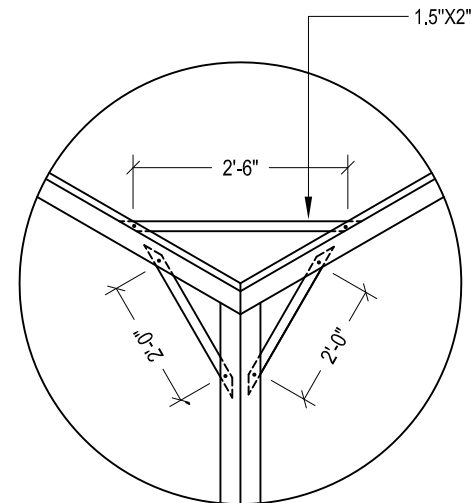
Detail 01: Bamboo into C C Katla



Detail 2: Plinth



Detail 3 : Corner and Roof Arrangement



Detail 4: Corner Bracing

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: KANAIGHAT, SYLHET

TYPE 2.2 : MUD WALL AND IKAR FENCE

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY :

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

MD. ABU SAYED RASHED

CLIENT

CARITAS  
BANGLADESH

FUNDING AGENCIES



CARITAS FRANCE

CARITAS  
LUXENBOURG

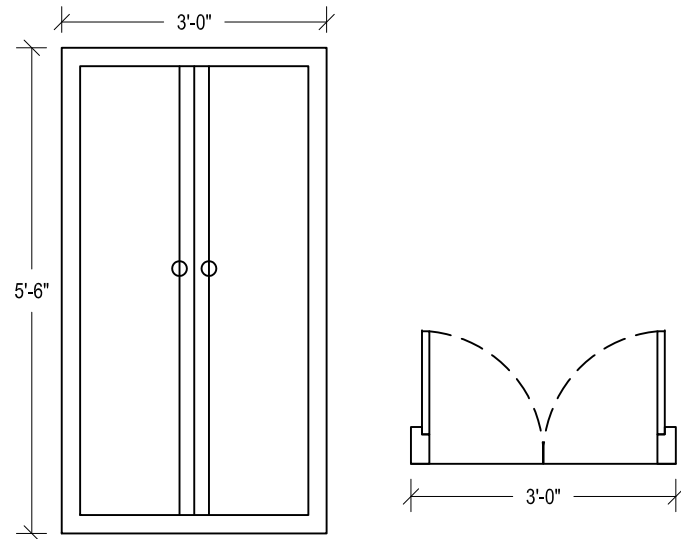
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DETAILS

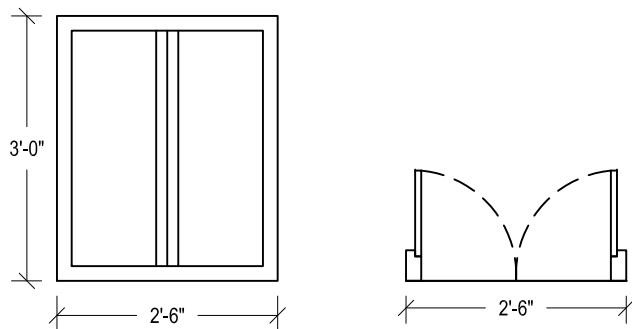
JULY, 2015

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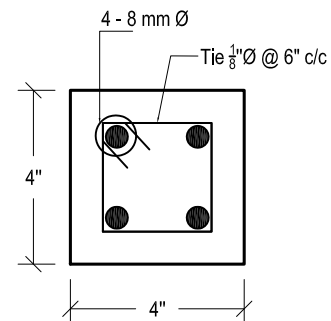
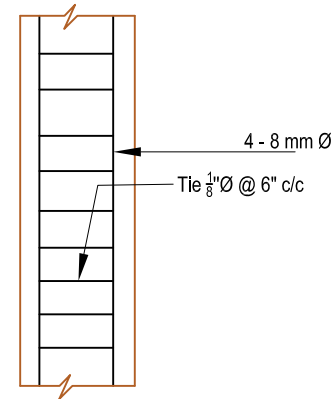
S - 04



Detail 05: Door



Detail 06: Window

**NOTE :**

Concrete - 1 : 2 : 4  
 Aggregate - Brick Chips  
                   - Sylhet Sand  
 Reinforcement - 60 Grade  
 Clear Cover -  $\frac{3}{4}$  "

Detail 07: RC Post(Long Section &amp; Cross Section)

**PROJECT NAME :**

**CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)**

LOCATION: KANAIGHAT, SYLHET

TYPE 2.2 : MUD WALL AND IKAR FENCE

**CONSULTANTS**

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESH



ENSAG-CRAterre  
Grenoble , France

**DESIGN BY:**

**BUET**

1. Prof. Dr. Tahsin Reza Hossain  
2. Prof. Dr. Mohammad Shariful Islam

**CRAterre**

3. Engr. Olivier Moles

**Caritas, Bangladesh**

1. Mr. Ratan Kumar Podder

**DRAWN BY :**

MD. ABU SAYED RASHED

**CLIENT**

CARITAS  
BANGLADESH

**FUNDING AGENCIES**

CARITAS FRANCE



CARITAS  
LUXEMBOURG

**DRAWING TITLE:****DETAILS**

JULY, 2015

SHEET NO:

S - 05

MEMBER SCHEDULE				
SL.	ITEMS NAME	DIMENSIONS	MATERIALS NAME	REMARKS
1.	Roof Cover	0.32 mm	CGI Sheet	
2.	Purlin	2"X1.5"	Timber	@ 2'-6" C/C
3.	Rafter	2"to2.5" dia	Bamboo	@ 2'-6" to 3'-6" C/C
4.	Corner Rafter	2"x2.5"	Timber	
5.	Tie	2"x1.5" Timber & 2" dia bamboo	Timber & Bamboo	@ 3'-0"to4'-0" C/C (Alternate)
6.	Roof Beam	2.5"x3.5" Timber & 3" dia bamboo	Timber & Bamboo	@ 4'-0" C/C (Alternate)
8.	Wall Plate	2"x3"	Timber	
9.	Corner Bracing	2"x2.5"	Timber	Both top and bottom
10.	Ikar Fencing (Top)		Ikar	
11.	Mud Wall (Bottom)	8" thick	Mud	3' height
12.	Interior Post	3" dia	Bamboo	With <i>Katla</i>
13.	Corner Post	4"x4"x11'-0"	R C	4-8 mm Ø 1:2:4 Concrete
14.	Fance Supporting Post	2" dia	Bamboo	
15.	Door	3'-0"x5'-6"	Timber	Position may be changed
16.	Window	2'-6"x3"-0"	Timber	Position may be changed

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: KANAIGHAT, SYLHET

TYPE 2.2 : MUD WALL AND IKAR FENCE

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRATERRE  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain  
2. Prof. Dr. Mohammad Shariful Islam

CRATERRE

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

CARITAS  
BANGLADESH

FUNDING AGENCIES



CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

MEMBER SCHEDULE

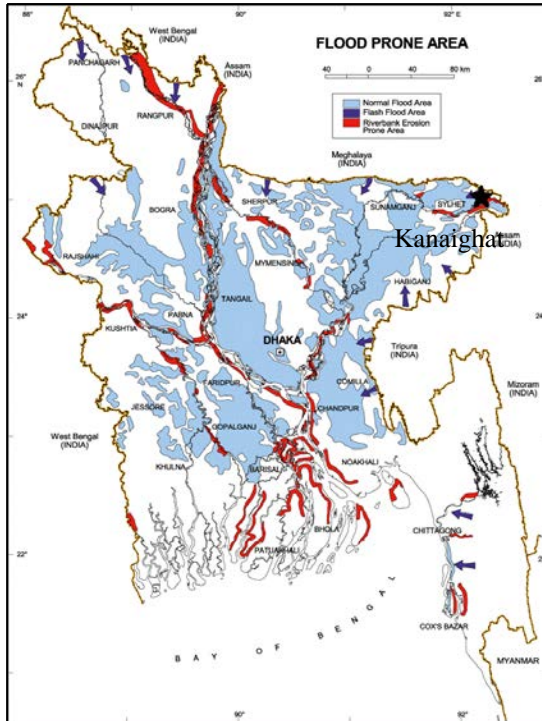
JULY, 2015

SHEET NO:

S - 06

## DIVISION: SYLHET

### 23. DESIGN OF LCH IN KANAIGHAT: TYPE – DP 1



#### SITE TOPOGRAPHY



#### General Information:

##### Location:

District: Sylhet  
Upazila: Kanaighat  
Union: Lauxmiprasad  
Mouza/ Village: Monipur

##### Climatic Feature:

Avg. Maximum Temperature: 33 °C  
Avg. Minimum temperature: 14°C  
Annual Rainfall: 3334 mm  
Average Relative Humidity: 73%

##### Geotechnical Feature:

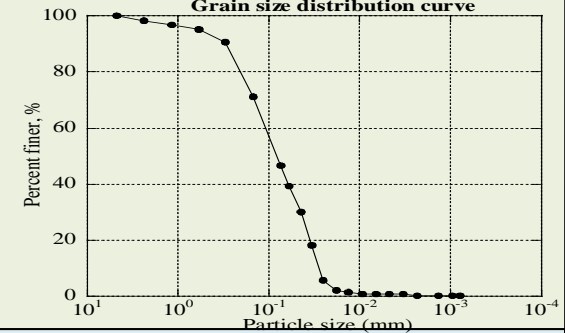
Topography: Plain land  
MSL: 11 m  
Soil Characteristics: Silt

##### Disaster:

Flood, river bank erosion, northwester, earth quake



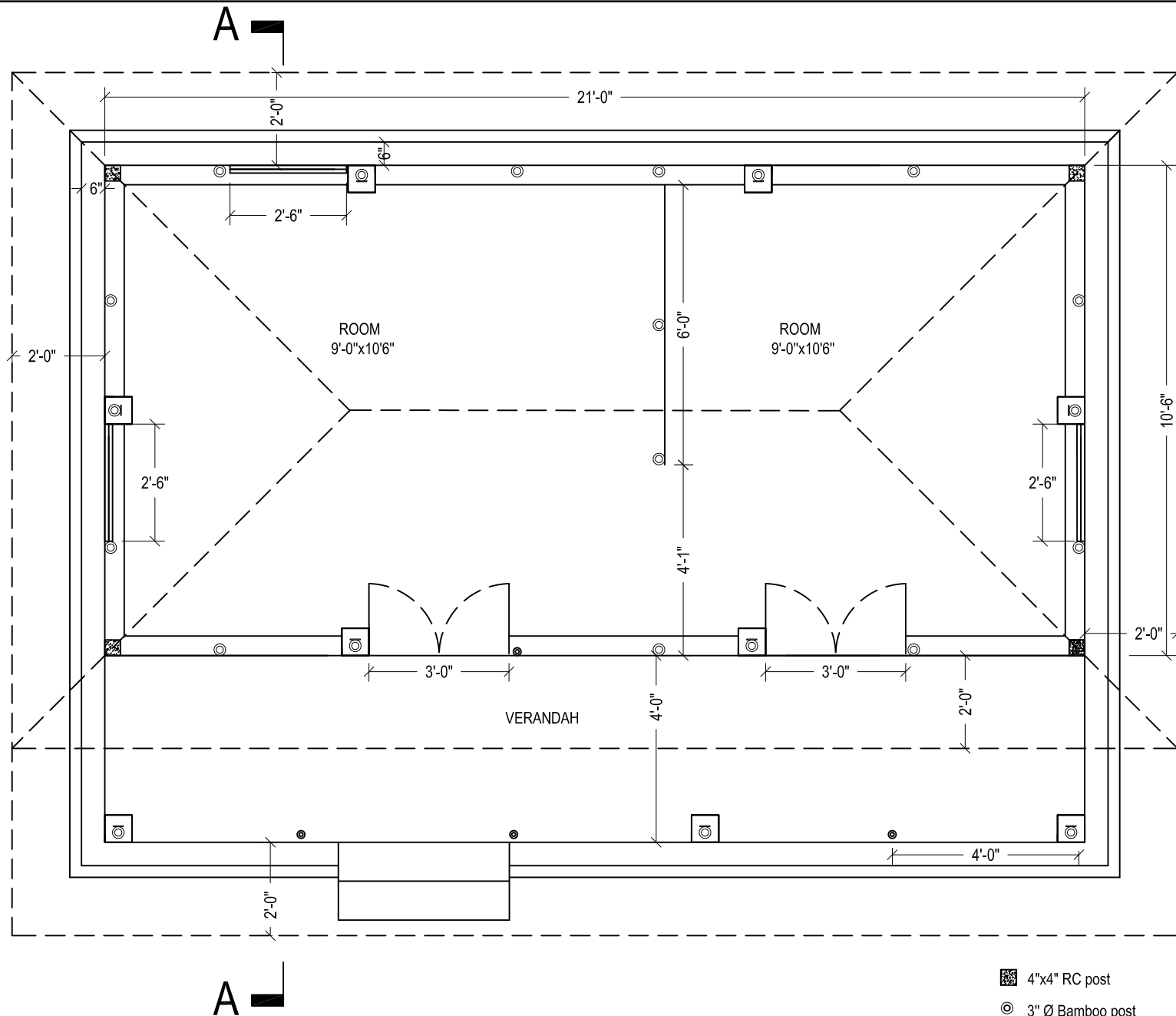
Completed House  
Grain size distribution curve



#### Design Considerations:

Available Building Materials: Mud, Bamboo, Timber etc  
Foundation: Bamboo posts/ *katla* embedded in soil (1-2 ft)  
Plinth: Mud  
Post: RC and bamboo posts with *katla*/without *katla*  
Fence/Wall: Bamboo mat over CGI sheet  
Openings: 1 main door + 1 inside door to connect rooms  
Ceiling: Ceiling is considered to protect heat and cold  
Rain water harvesting system  
Treatment (bamboo & wood): Water treatment & partial chemical treatment

Roof Type: Four pitched & veranda  
roof is disconnected from main roof  
Roof cover: CGI sheets  
Roof structure: Wooden/ bamboo truss  
Bracing: Corner bracing  
Joints: Nails, notches, GI wire  
Cost: Tk. 85,000



PLAN

- 4"x4" RC post
- 3" Ø Bamboo post
- 2" Ø Bamboo post
- Katla with 3" Ø Bamboo post

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: KANAIGHAT, SYLHET.

TYPE : DP 1

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRATERRE  
Grenoble, France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRATERRE

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

MD. ABU SAYED RASHED

CLIENT

CARITAS  
BANGLADESH

FUNDING AGENCIES



CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

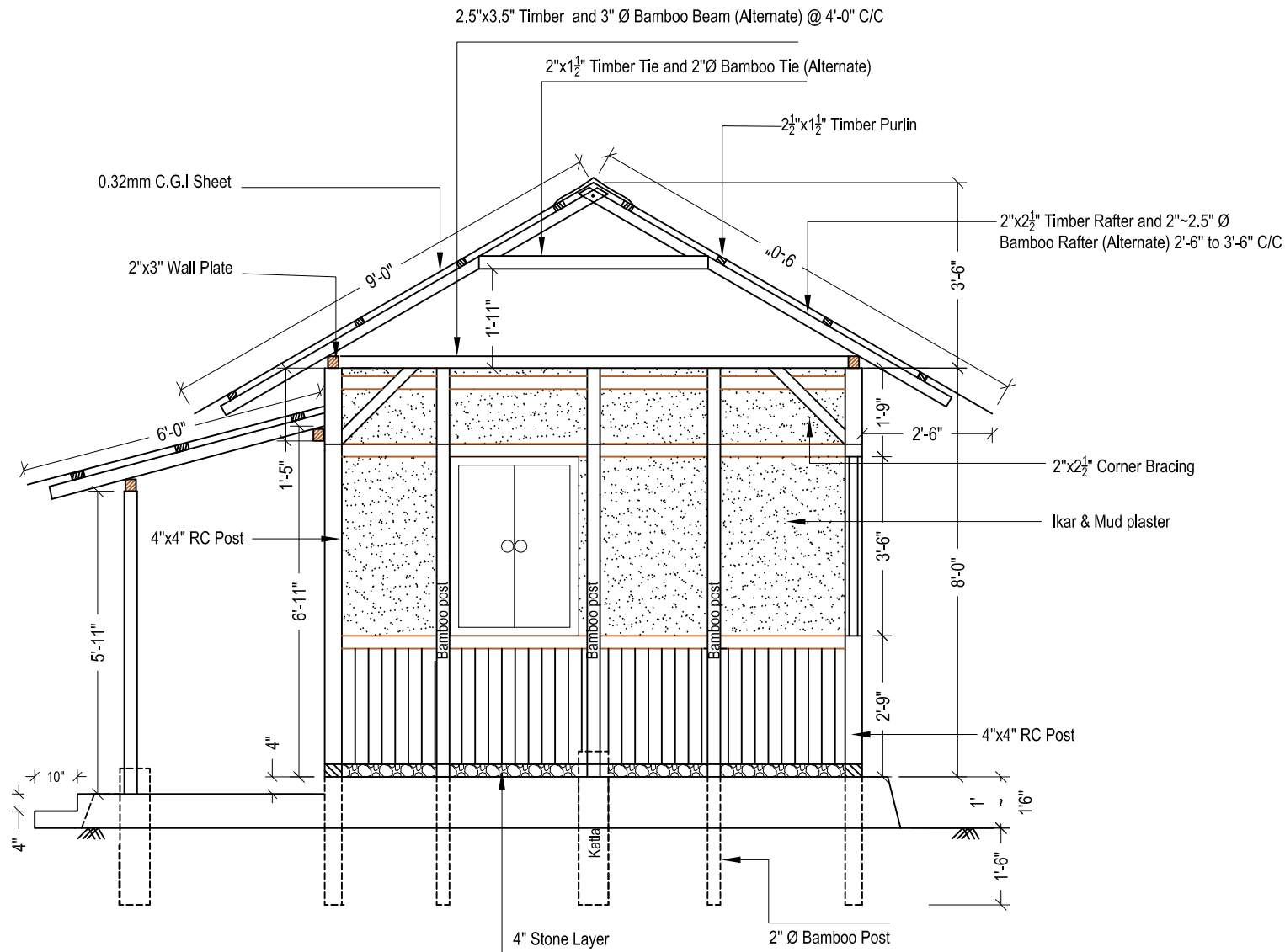
PLAN

JULY, 2015

SHEET NO:

S - 01





SECTION: A - A

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: KANAIGHAT, SYLHET.

TYPE : DP 1

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

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CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

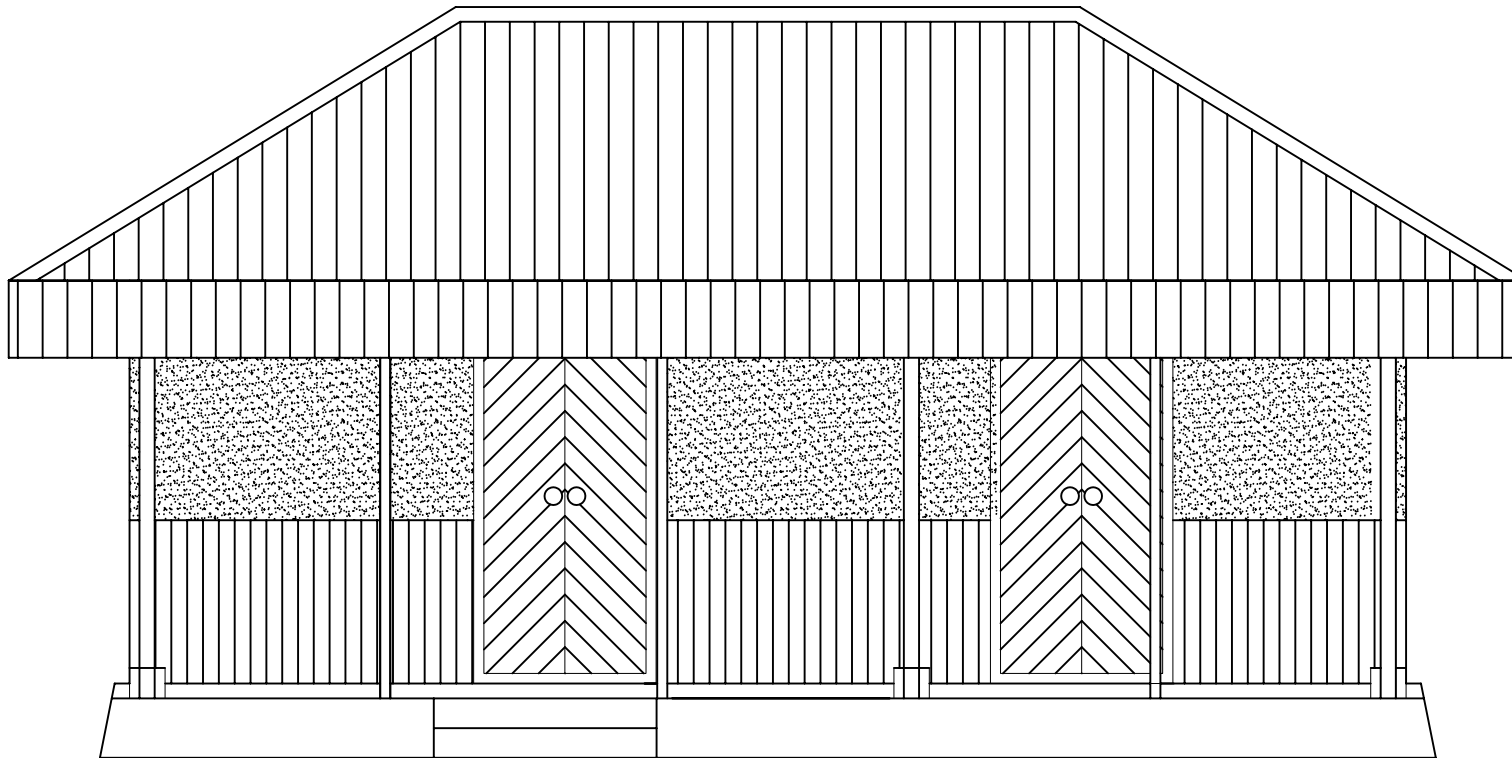
DRAWING TITLE:

SECTION: A - A

JULY, 2015

SHEET NO:

S - 02



FRONT ELEVATION

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: KANAIGHAT, SYLHET.

TYPE : DP 1

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAtterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAtterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

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CLIENT

FUNDING AGENCIES

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BANGLADESH

CARITAS FRANCE

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LUXEMBOURG

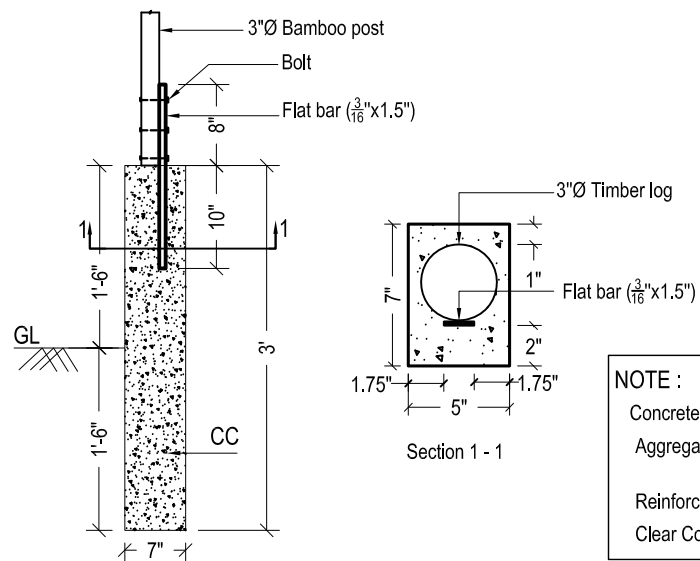
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FRONT ELEVATION

JULY, 2015

SHEET NO:

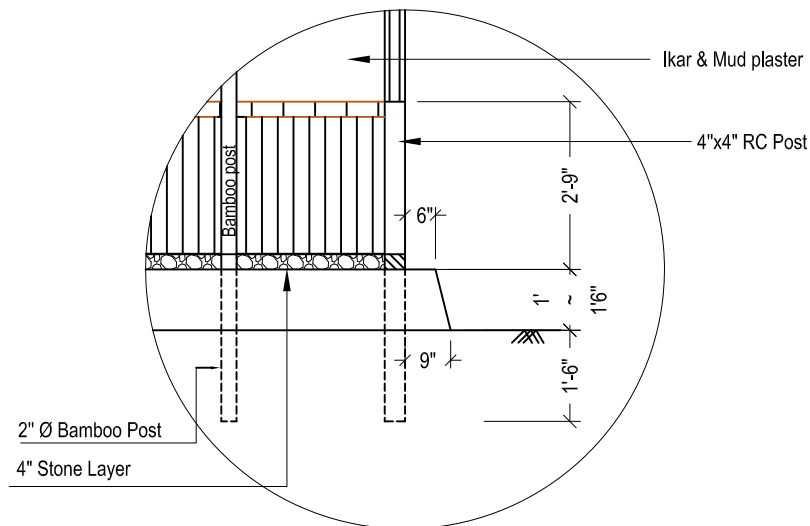
S - 03



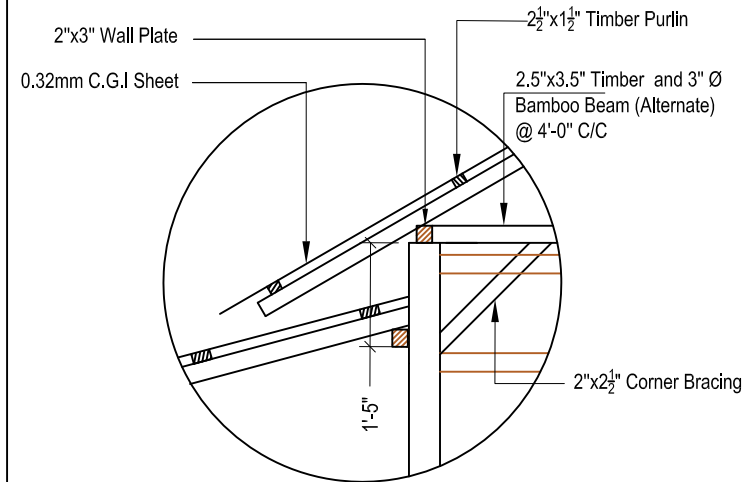
## NOTE :

Concrete	- 1 : 2 : 4
Aggregate	- Brick Chips - Sylhet Sand
Reinforcement	- 60 Grade
Clear Cover	- $\frac{3}{4}$ "

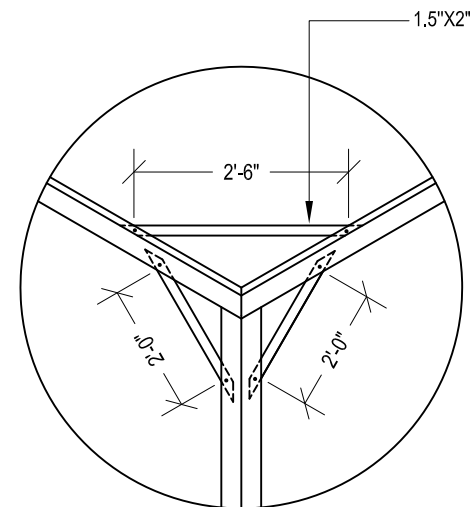
Detail 01: C C Katla



Detail 02 : plinth



Detail 03: Corner Bracing and Roof Arrangement



Detail 04: Corner Bracing

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: KANAIGHAT, SYLHET.

TYPE : DP 1

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

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2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

MD. ABU SAYED RASHED

CLIENT

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LUXEMBOURG

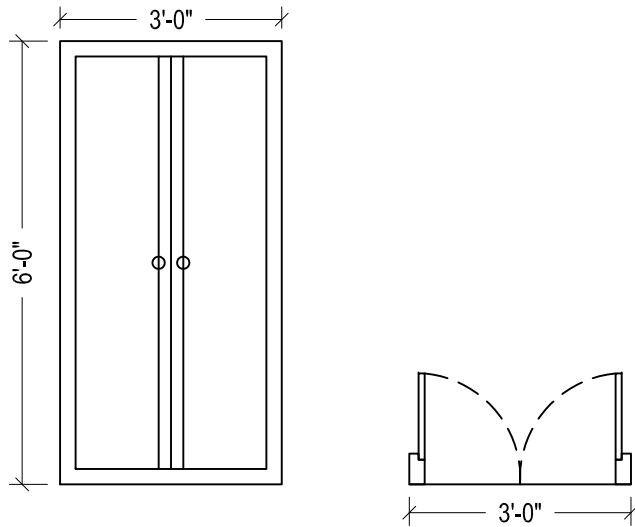
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DETAILS

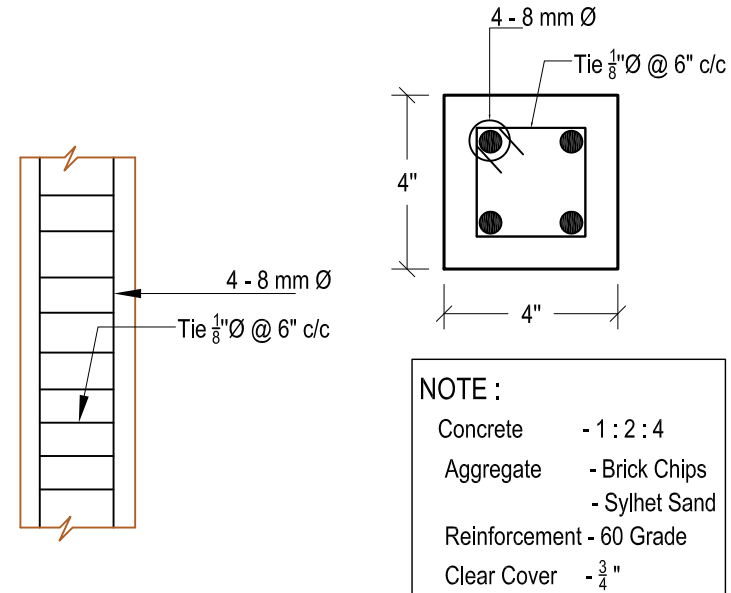
JULY, 2015

SHEET NO:

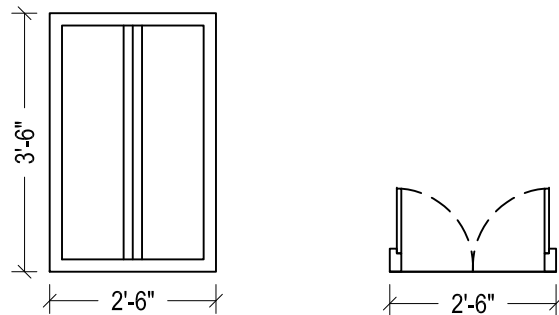
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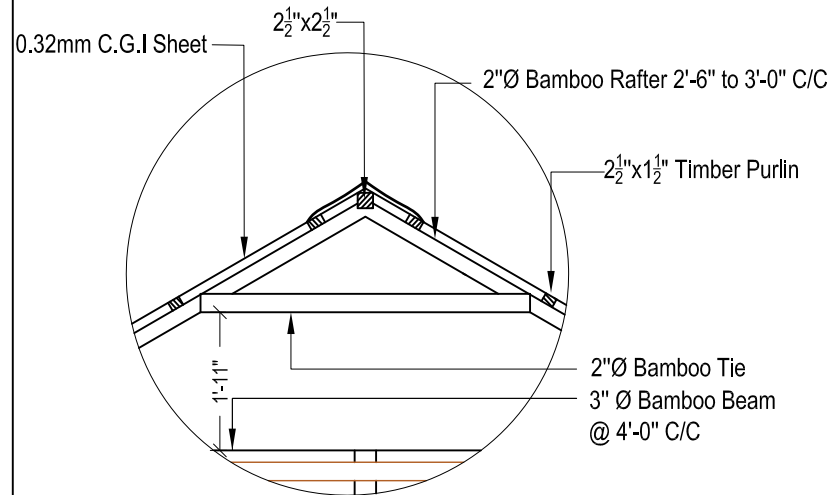
Detail 05: Door



Detail 07: RC Post (Long Section and Cross Section)



Detail 06: window



Detail 08: Roof Top

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: KANAIGHAT, SYLHET.

TYPE : DP 1

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain  
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

MD. ABU SAYED RASHED

CLIENT

CARITAS  
BANGLADESH

FUNDING AGENCIES



CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

DETAILS

JULY, 2015

SHEET NO:

S - 05

MEMBER SCHEDULE				
SL.	ITEMS NAME	DIMENSIONS	MATERIALS NAME	REMARKS
1.	Roof Cover	0.32 mm	CGI Sheet	
2.	Purlin	2"x1.5"	Timber	@ 2'-6" C/C
3.	Rafter	2"x2.5" Timber & 2.5" dia Bamboo	Timber & Bamboo	@ 2'-6" to 3'-6" C/C
4.	Tie	2"x1.5" Timber & 2" dia bamboo	Timber & Bamboo	@ 3'-0" to 4'-0" C/C (Alternate)
5.	Roof Beam	2.5"x3.5" Timber & 3" dia bamboo	Timber & Bamboo	@ 4'-0" C/C (Alternate)
6.	Wall Plate	2"x3"	Timber	
8.	Corner Bracing	2"x2.5"	Timber	Both top and bottom
9.	Mud & Ikar Wall (Top)		Mud & Ikar	
10.	Fance (Bottom)	0.25 mm	CGI Sheet	3' height
11.	Interior Post	3" dia	Bamboo	With <i>Katla</i>
12.	Corner Post	4"x4"x11'-0"	R C	4-8 mm Ø 1:2:4 Concrete
13.	Fance Supporting Post	2" dia	Bamboo	Without <i>Katla</i>
14.	Stone layer	4" Thick	Stone	One layer over mud plinth
15.	Door	3'-0"x6'-0"	Timber	Position may be changed
16.	Window	2'-6"x3'-6"	Timber	Position may be changed

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: KANAIGHAT, SYLHET.

TYPE : DP 1

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRATERRE  
Grenoble, France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain  
2. Prof. Dr. Mohammad Shariful Islam

CRATERRE

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

CARITAS  
BANGLADESH

FUNDING AGENCIES



CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

MEMBER SCHEDULE

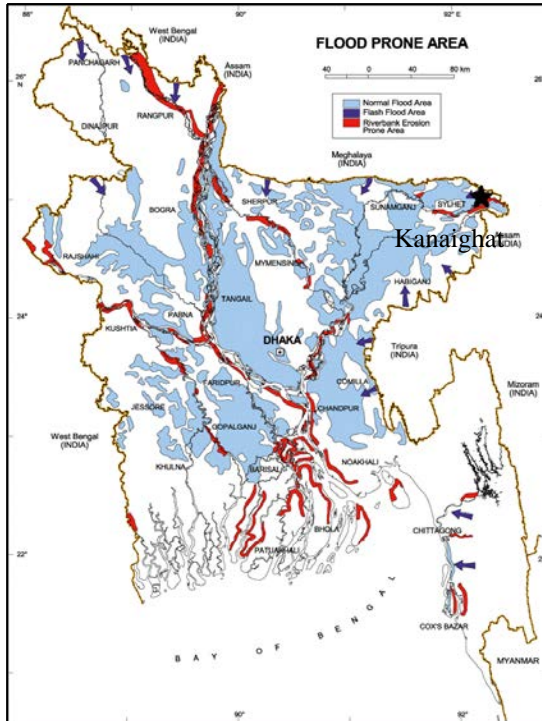
JULY, 2015

SHEET NO:

S - 06

## DIVISION: SYLHET

### 24. DESIGN OF LCH IN KULAURA: TYPE – DP 1



#### General Information:

##### Location:

District: Maulvibazar

Upazila: Kulaura

Union: Teelagaon

Mouza/ Village: Miyarpara

##### Climatic Feature:

Avg. Maximum Temperature: 33 °C

Avg. Minimum temperature: 14°C

Annual Rainfall: 3334 mm

Average Relative Humidity: 73%

##### Geotechnical Feature:

Topography: Plain land

MSL: 7 m

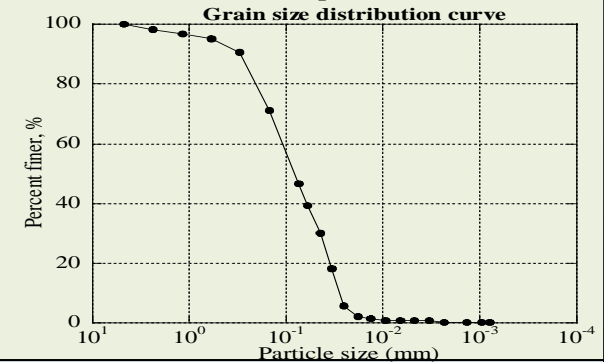
Soil Characteristics: Loamy

##### Disaster:

Flash flood, northwester, earth quake



#### Completed House



#### Design Considerations:

Available Building Materials: Mud, Bamboo, Timber , RC posts etc

Foundation: Bamboo posts/ *katla* embedded in soil (1-2 ft)

Plinth: Mud (two/three steps)

Post: RC and bamboo posts with *katla*/without *katla*

Fence/Wall: CGI sheet and *tati*

Openings: 1 main door + 1 inside door to connect rooms

Ceiling: Ceiling is considered to protect heat and cold

Rain water harvesting system

Treatment (bamboo & wood): Water treatment & partial chemical treatment

Roof Type: Four pitched & veranda  
roof is disconnected from main roof

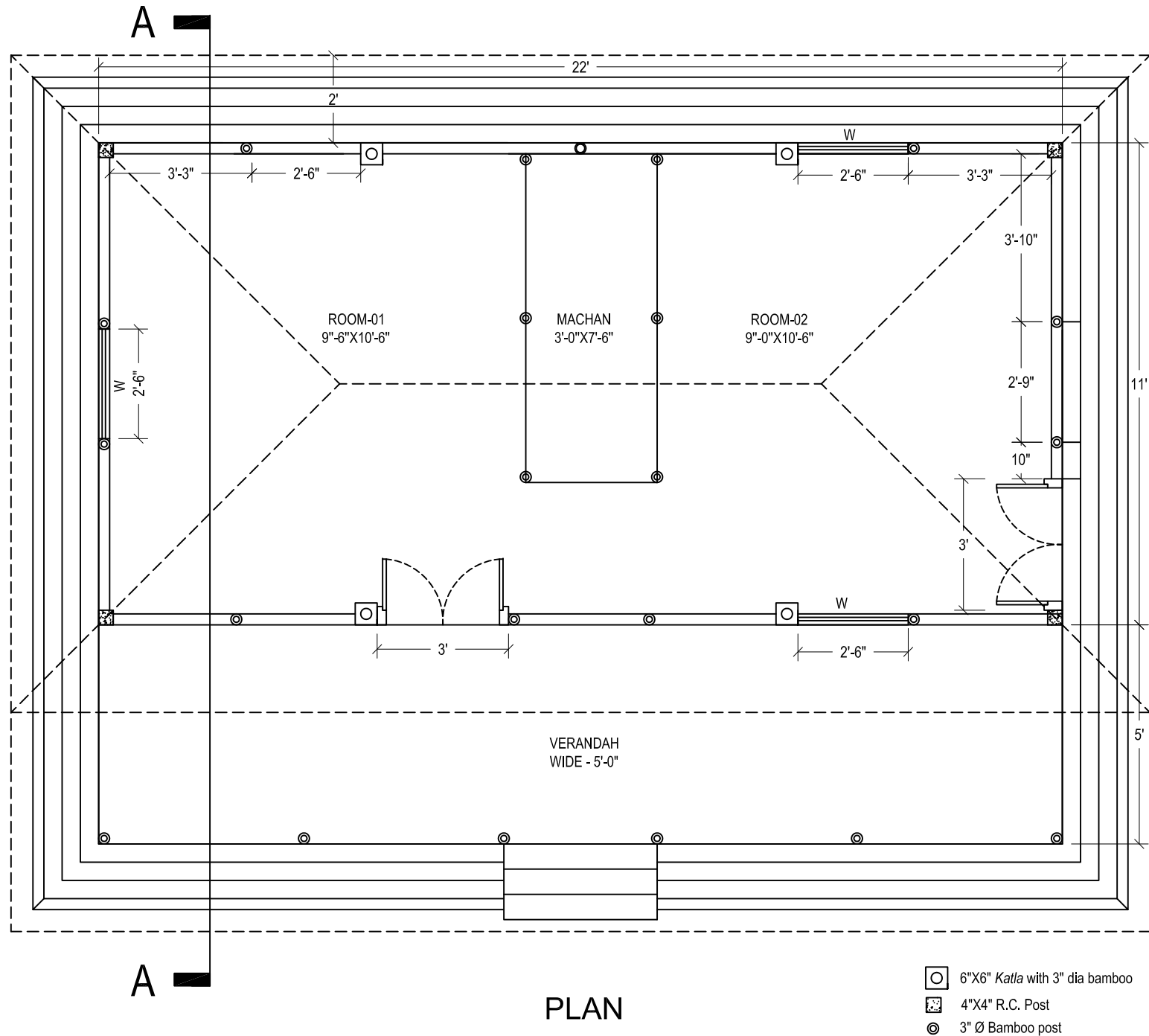
Roof cover: CGI sheets

Roof structure: Wooden truss

Bracing: Corner bracing

Joints: Nails, notches, GI wire

Cost: Tk. 85,000



PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: KULAURA, MOULOVI BAZAR

TYPE: DP-1

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble, France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

CARITAS  
BANGLADESH

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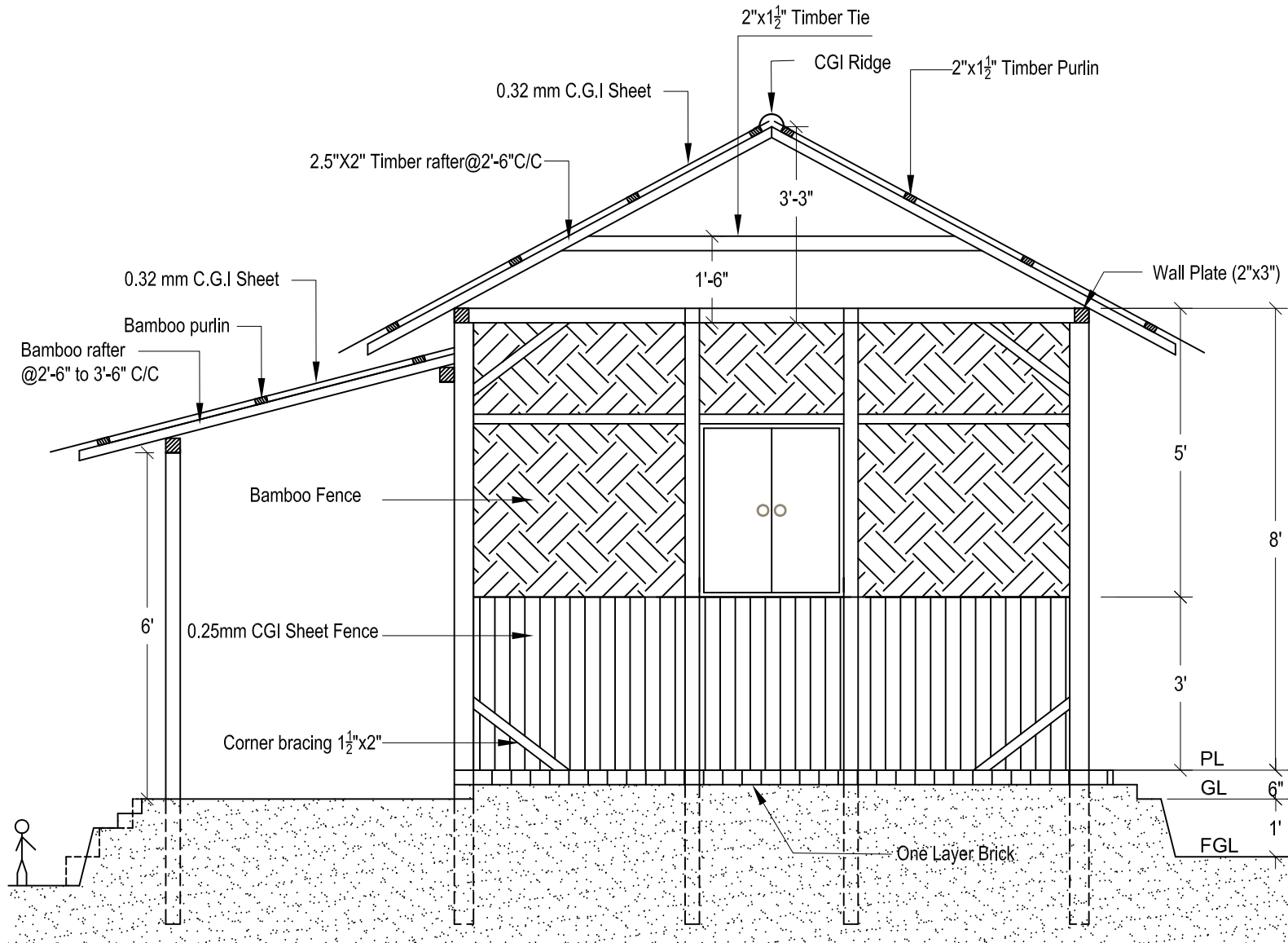
DRAWING TITLE:

PLAN

JULY, 2015

SHEET NO:

S - 01



SECTION : A - A

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: KULaura, MOULOVI BAZAR

TYPE: DP-1

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRATERre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRATERre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

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DRAWING TITLE:

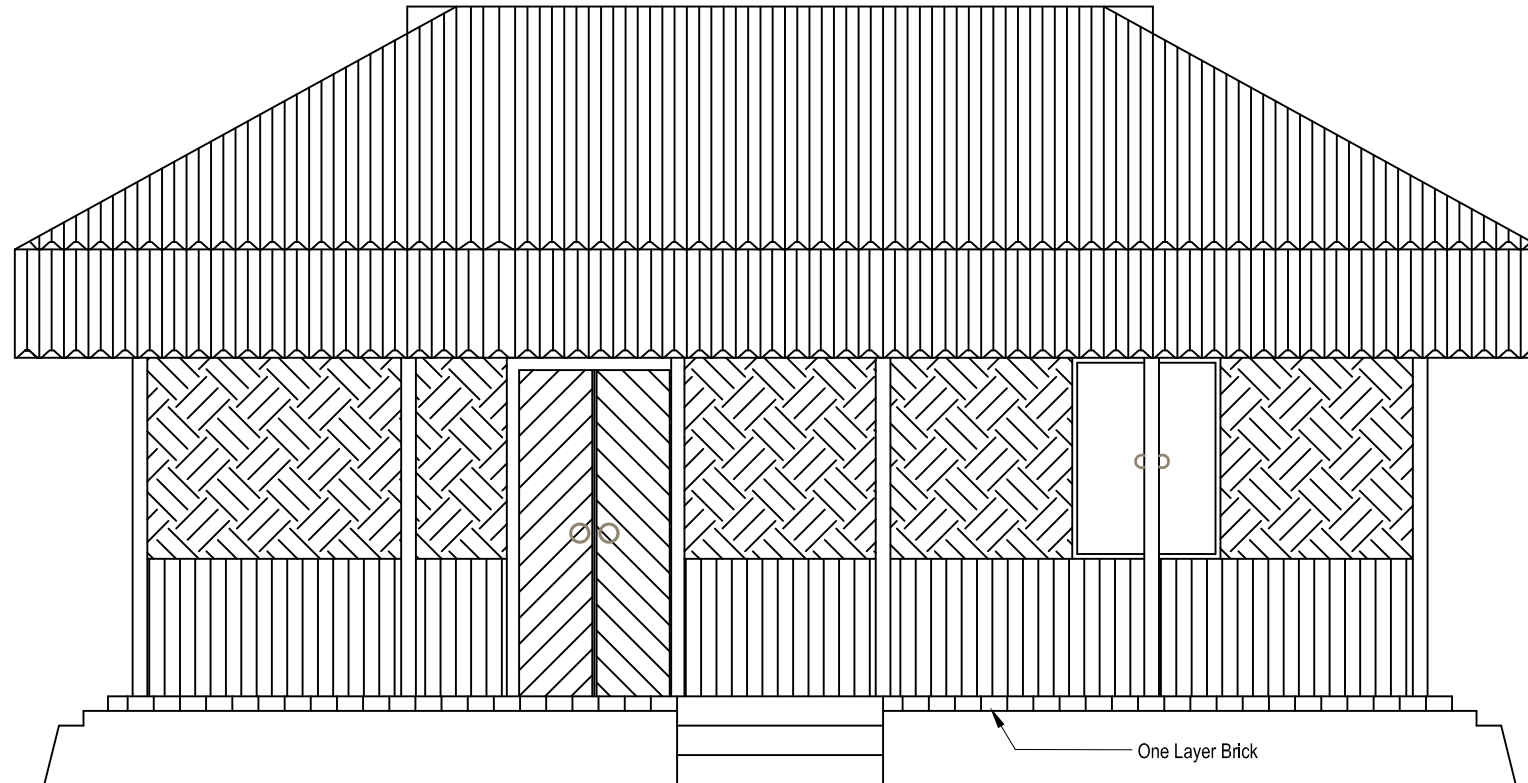
SECTION A - A

JULY, 2015

SHEET NO:

S - 02





ELEVATION

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: KULaura, MOULOVI BAZAR

TYPE: DP-1

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble, France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

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CLIENT

CARITAS  
BANGLADESH

FUNDING AGENCIES



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LUXEMBOURG

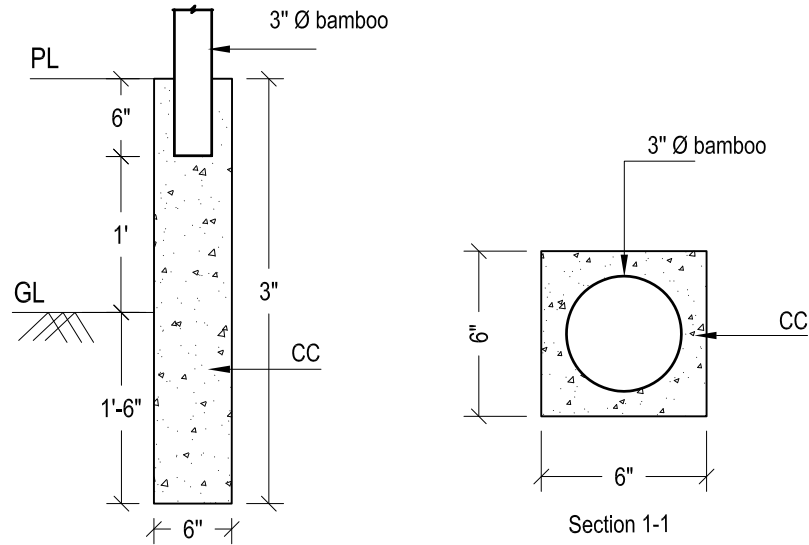
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ELEVATION

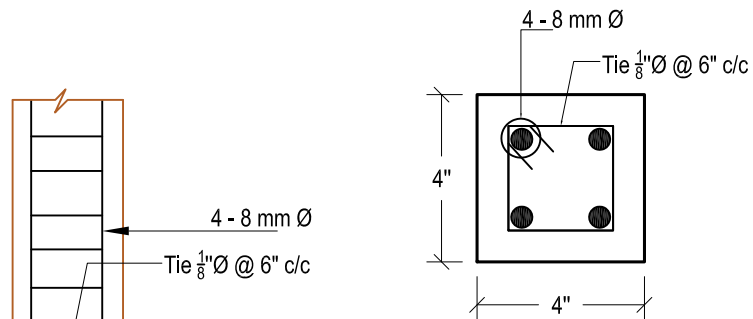
JULY, 2015

SHEET NO:

S - 03

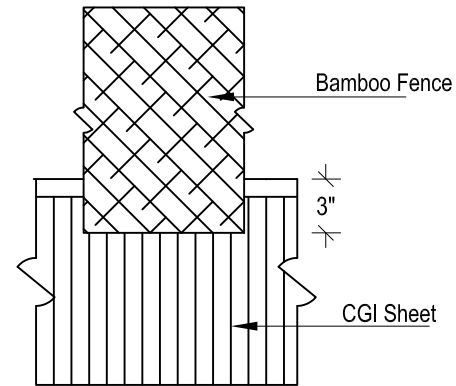


Detail 01: Bamboo into C C Katla

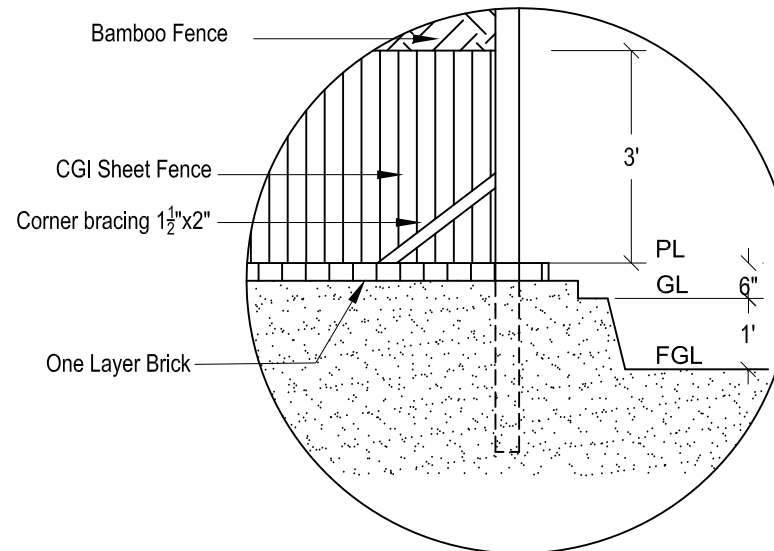
**NOTE :**

- Concrete - 1 : 2 : 4  
 Aggregate - Brick Chips  
                   - Sylhet Sand  
 Reinforcement - 60 Grade  
 Clear Cover -  $\frac{3}{4}$ "

Detail 02: RC Post (Long Section &amp; Cross Section)



Detail 03 : Fence joint CGI Sheet &amp; Bamboo



Detail 04 : Plinth

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: KULaura, MOULOVI BAZAR

TYPE: DP-1

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

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2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

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CLIENT

CARITAS  
BANGLADESH

FUNDING AGENCIES

Caritas France  
Secours Catholique

CARITAS FRANCE

CARITAS  
LUXEMBOURG

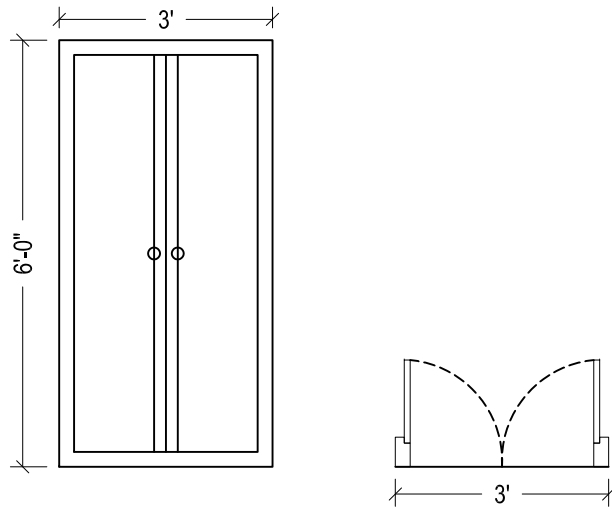
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DETAILS

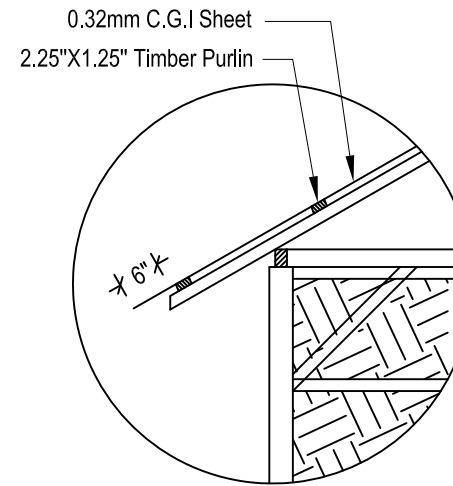
JULY, 2015

SHEET NO:

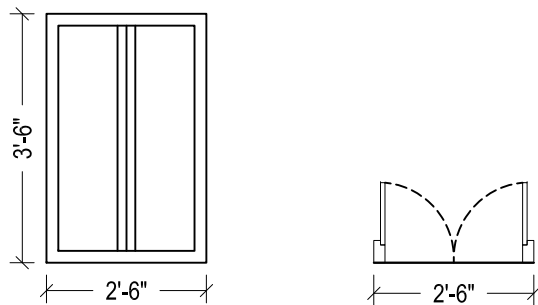
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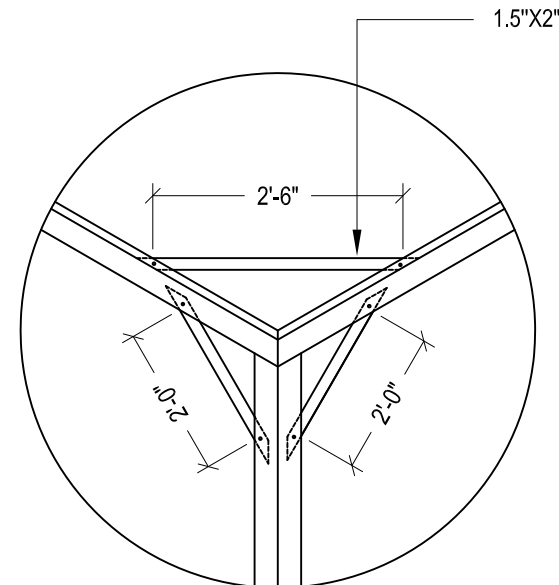
Detail 05: door



Detail 07: Corner Bracing and Roof Arrangement



Detail 06: window



Detail 08: Corner Bracing

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: KULaura, MOULOVI BAZAR

TYPE: DP-1

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRATERre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRATERre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

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BANGLADESH

FUNDING AGENCIES

Caritas France  
Secours Catholique

CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

DETAILS

JULY, 2015

SHEET NO:

S - 05

MEMBER SCHEDULE				
SL.	ITEMS NAME	DIMENSIONS	MATERIALS NAME	REMARKS
1.	Roof Cover	0.32 mm	CGI Sheet	
2.	Purlin (Main house)	2"x1.5"	Timber	
3.	Purlin (Verandha)		Bamboo	
4.	Rafter (Main house)	2"x2.5"	Timber	@ 2'-6" C/C
5.	Rafter (Verandha)		Bamboo	@ 2'-6" to 3'-6" C/C
6.	Tie	2"x1.5" Timber & 2" dia bamboo	Timber & Bamboo	@ 3'-0" to 4'-0" C/C (Alternate)
8.	Roof Beam	2.5"x3.5" Timber & 3" dia bamboo	Timber & Bamboo	@ 4'-0" C/C (Alternate)
9.	Wall Plate	2"x3"	Timber	
10.	Corner Bracing	1.5"x2"	Timber	Both top and bottom
11.	Fance (Top)		Bamboo Mat	
12.	Fance (Bottom)	0.25 mm	CGI Sheet	3' height
13.	Interior Post	3" dia	Bamboo	With <i>Katla</i>
14.	Corner Post	4"x4"x11'-0"	R C	4-8 mm Ø 1:2:4 Concrete
15.	Fance Supporting Post	2" dia	Bamboo	Without <i>Katla</i>
16.	Brick layer	3" Thick	Brick	One layer over mud plinth
17.	Door	3'-0"x6'-0"	Timber	Position may be changed
18.	Window	2'-6"x3'-6"	Timber	Position may be changed

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: KULAURA, MOULOVI BAZAR

TYPE: DP-1

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRATERRE  
Grenoble, France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain  
2. Prof. Dr. Mohammad Shariful Islam

CRATERRE

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

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FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

MEMBER SCHEDULE

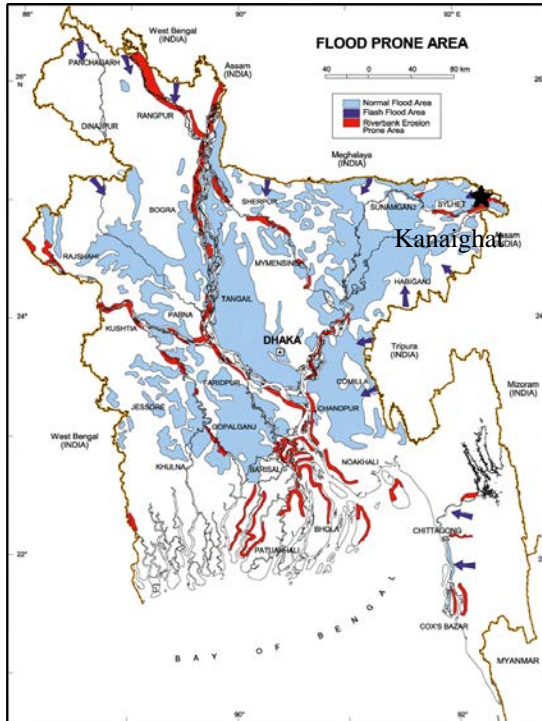
JULY, 2015

SHEET NO:

S - 06

## DIVISION: SYLHET

### 25. DESIGN OF LCH IN TAHIRPUR: TYPE – DP



#### General Information:

##### Location:

District: Sunamganj  
Upazila: Tahirpur  
Union: Uttor Sreepur  
Mouza/ Village: Indropur

##### Climatic Feature:

Avg. Maximum Temperature: 33 °C  
Avg. Minimum temperature: 14°C  
Annual Rainfall: 3334 mm  
Average Relative Humidity: 73%

##### Geotechnical Feature:

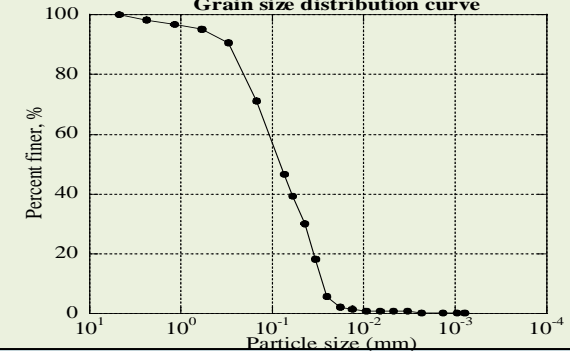
Topography: Plain land  
MSL: 11 m  
Soil Characteristics: Silt

##### Disaster:

Flash flood, northwester, earth quake



Completed House  
Grain size distribution curve



#### Design Considerations:

Available Building Materials: Mud, Bamboo, Timber , RC posts etc

Foundation: Bamboo posts/ *katla* embedded in soil (1-2 ft)

Plinth: Mud (two/three steps)

Post: RC and bamboo posts with *katla*/without *katla*

Fence/Wall: Bamboo mat over CGI sheet

Openings: 1 main door + 1 inside door to connect rooms

Ceiling: Ceiling is considered to protect heat and cold

Rain water harvesting system

Treatment (bamboo & wood): Water treatment & partial chemical treatment

Roof Type: Four pitched & veranda

roof is disconnected from main roof

Roof cover: CGI sheets

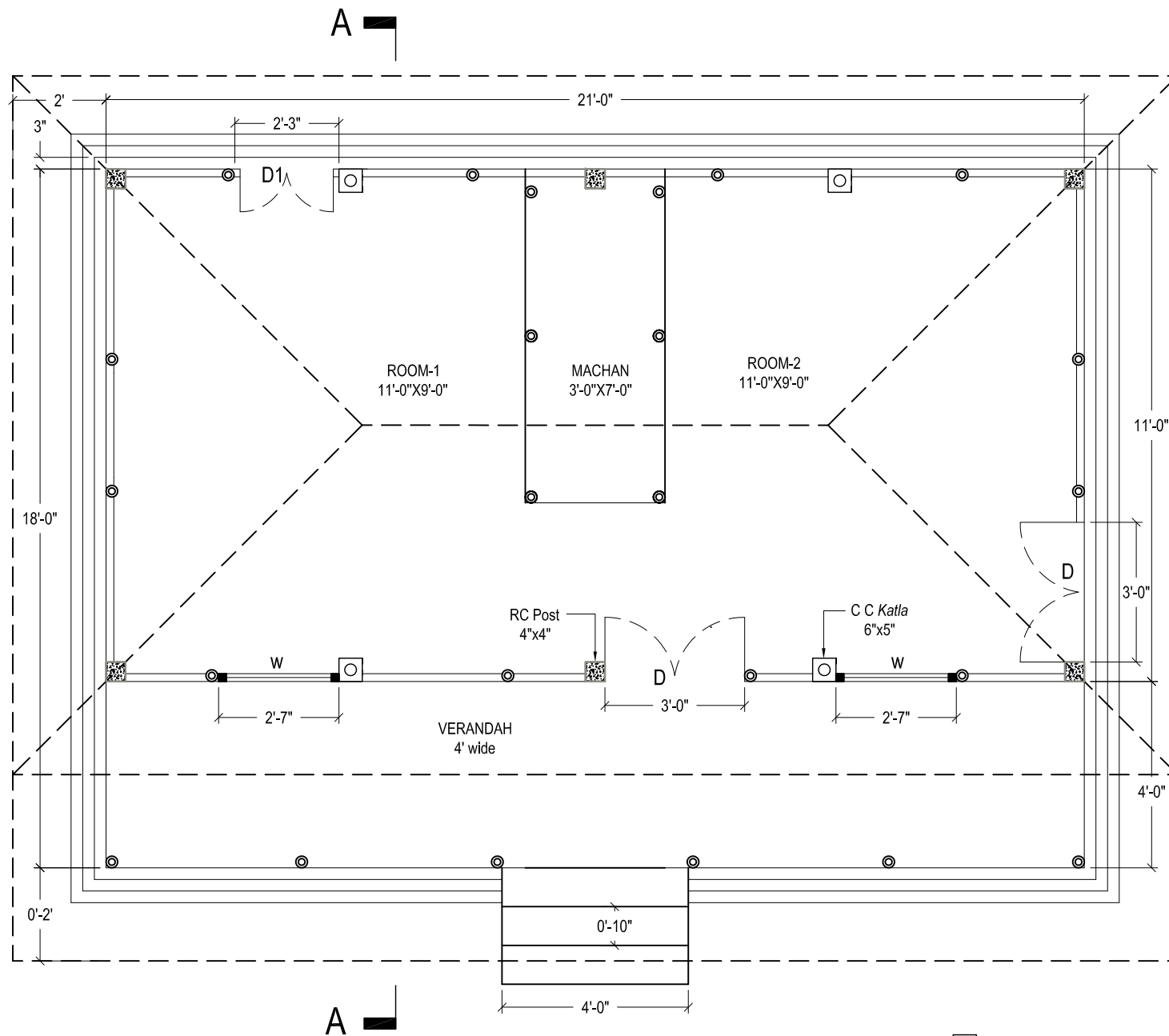
Roof structure: Wooden truss

Bracing: Corner bracing

Joints: Nails, notches, GI wire

Cost: Tk. 85,000

D178



PLAN

- 6"x5" C.C. Katla
- 4"x4" R.C. Post
- 3" Bamboo Post

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: TAHERPUR, SUNAMGONJ

TYPE: DP-2  
IKAR FENCE WITH MUD PLASTER

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA,  
BANGLADESHENSAG-CRAterre  
Grenoble, France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

Md. Abu Sayed Rashed

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

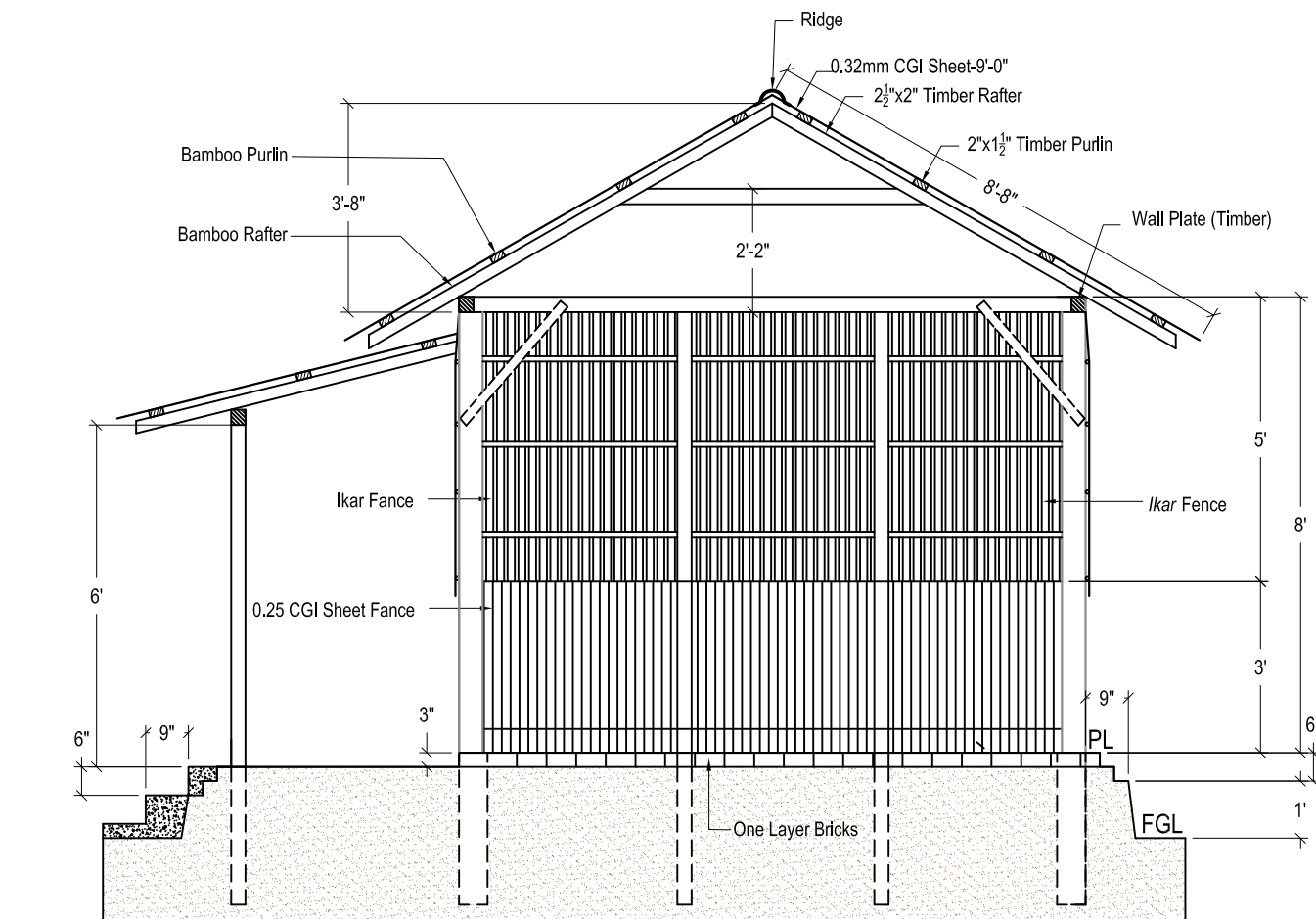
PLAN

REV. 01






JULY, 2015

SHEET NO:

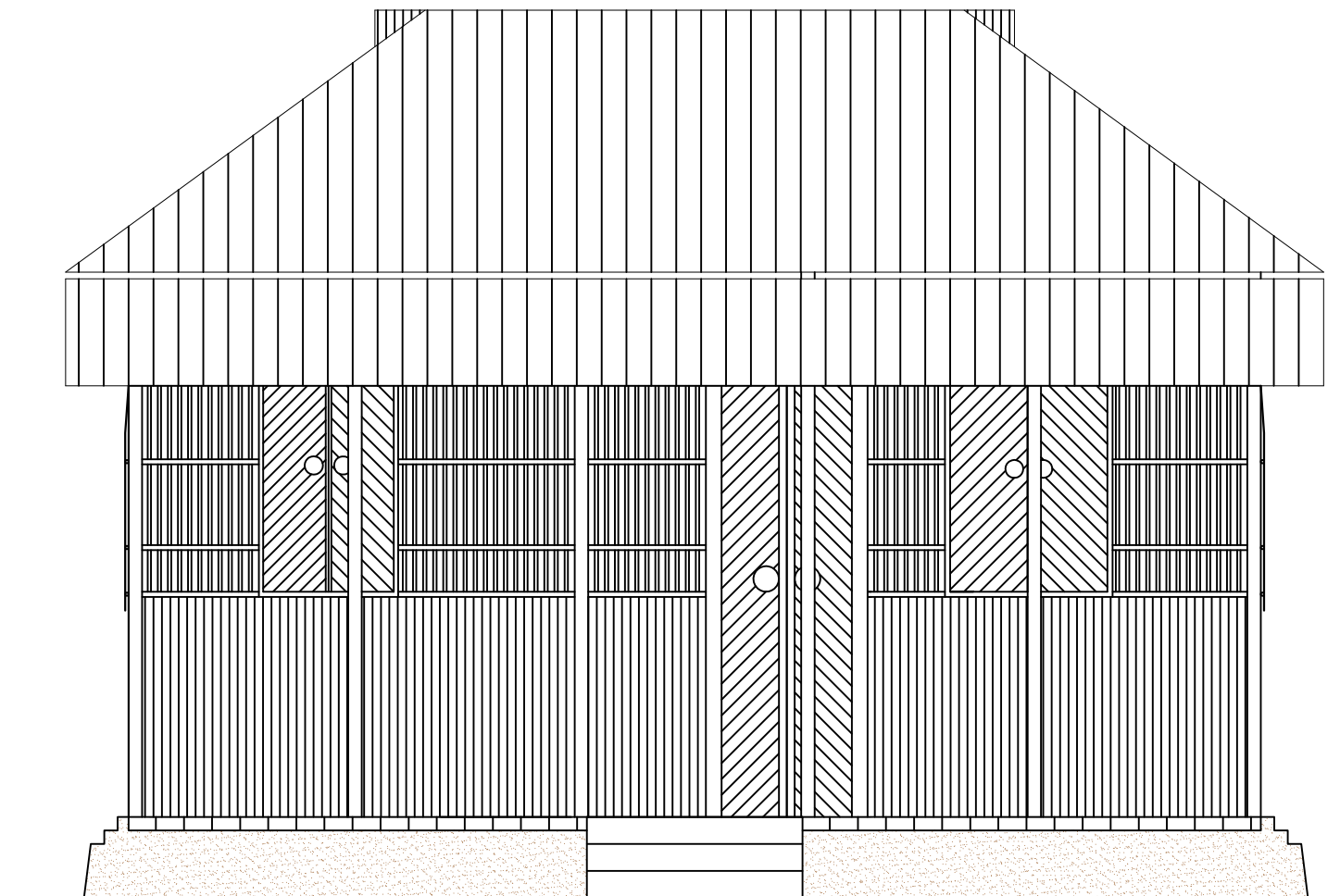
S - 01



SECTION : A - A

PROJECT NAME :	
CONSTRUCTION OF PILOT LOW COST HOUSES (LCH)	
LOCATION: TAHERPUR, SUNAMGONJ	
TYPE: DP-2 IKAR FENCE WITH MUD PLASTER	
CONSULTANTS	
 <p>DEPARTMENT OF CIVIL ENGINEERING, BRTC, BUET, DHAKA BANGLADESH</p>	 <p>ENSAG-CRATERRE Grenoble, France</p>
DESIGN BY:	
<p>BUET</p> <p>1. Prof. Dr. Tahsin Reza Hossain 2. Prof. Dr. Mohammad Shariful Islam</p> <p>CRATERRE</p> <p>3. Engr. Olivier Moles</p> <p>Caritas, Bangladesh</p> <p>1. Mr. Ratan Kumar Podder</p>	
DRAWN BY :	
Md. Abu Sayed Rashed	
CLIENT	FUNDING AGENCIES
 <p>CARITAS BANGLADESH</p>	 <p>CARITAS FRANCE</p>  <p>CARITAS LUXEMBOURG</p>
DRAWING TITLE:	
Section A - A	
JULY, 2015	SHEET NO: S - 02

D180



FRONT ELEVATION

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: TAHERPUR, SUNAMGONJ

TYPE: DP-2  
IKAR FENCE WITH MUD PLASTER

CONSULTANTS



DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESH



ENSAG-CRAterre  
Grenoble, France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY :

Md. Abu Sayed Rashed

CLIENT

FUNDING AGENCIES



CARITAS  
BANGLADESH



CARITAS FRANCE



CARITAS  
LUXEMBOURG

DRAWING TITLE:

FRONT ELEVATION

JULY, 2015

SHEET NO:

S - 03



				<div>PROJECT NAME : CONSTRUCTION OF PILOT LOW COST HOUSES (LCH)</div> <div>LOCATION: TAHERPUR, SUNAMGONJ</div> <div>TYPE: DP-2 IKAR FENCE WITH MUD PLASTER</div> <div>CONSULTANTS<div><div></div><div>DEPARTMENT OF CIVIL ENGINEERING, BRTC, BUET, DHAKA BANGLADESH</div></div><div><div></div><div>ENSAG-CRATERRE Grenoble, France</div></div></div> <div>DESIGN BY: BUET 1. Prof. Dr. Tahsin Reza Hossain 2. Prof. Dr. Mohammad Shariful Islam</div> <div>CRATERRE 3. Engr. Olivier Moles</div> <div>Caritas, Bangladesh 1. Mr. Ratan Kumar Podder</div>	
<div>Detail 01: door</div>		<div>Detail 03: Corner Bracing and Roof Arrangement</div>			
				<div>DRAWN BY : Md. Abu Sayed Rashed</div> <div>CLIENTFUNDING AGENCIES<div><div><div></div><div>CARITAS BANGLADESH</div></div><div><div></div><div>CARITAS FRANCE</div></div><div><div></div><div>CARITAS LUXEMBOURG</div></div></div></div> <div>DRAWING TITLE: Drawing Detail - 1</div> <div>JULY, 2015SHEET NO: S - 04</div>	
<div>Detail 02: window</div>		<div>Detail 04: Plinth</div>			

<p style="text-align: center;">Section 1-1</p>		<p><b>PROJECT NAME :</b></p> <p><b>CONSTRUCTION OF PILOT LOW COST HOUSES (LCH)</b></p> <p><b>LOCATION:</b> TAHERPUR, SUNAMGONJ</p> <p><b>TYPE:</b> DP-2 IKAR FENCE WITH MUD PLASTER</p> <p><b>CONSULTANTS</b></p> <div><div><p>DEPARTMENT OF CIVIL ENGINEERING, BRTC, BUET, DHAKA BANGLADESH</p></div><div><p>ENSAG-CRAterre Grenoble, France</p></div></div> <p><b>DESIGN BY:</b></p> <p><u>BUET</u> 1. Prof. Dr. Tahsin Reza Hossain 2. Prof. Dr. Mohammad Shariful Islam</p> <p><u>CRAterre</u> 3. Engr. Olivier Moles</p> <p><u>Caritas, Bangladesh</u> 1. Mr. Ratan Kumar Podder</p>	
<p style="text-align: center;">Detail 05: Bamboo into C C Katla</p>		<p style="text-align: center;">Detail 07 : Fence Joint CGI Sheet &amp; Ikar</p>	
<p style="text-align: center;">NOTE :</p> <p>Concrete - 1 : 2 : 4</p> <p>Aggregate - Brick Chips - Sylhet Sand</p> <p>Reinforcement - 60 Grade</p> <p>Clear Cover - 3/4 inch</p>			
<p style="text-align: center;">Detail 06: RC Post (Long Section &amp; Cross Section)</p>		<p style="text-align: center;">Detail 08: Corner Bracing</p>	
<p>JULY, 2015</p>		<p>SHEET NO: S - 05</p>	

MEMBER SCHEDULE				
SL.	ITEMS NAME	DIMENSIONS	MATERIALS NAME	REMARKS
1.	Roof Cover	0.32 mm	CGI Sheet	
2.	Purlin (Main house)	2"x1.5"	Timber	
3.	Purlin (Verandha)		Bamboo	
4.	Rafter (Main house)	2"x2.5"	Timber	@ 2'-6" C/C
5.	Rafter (Verandha)		Bamboo	@ 2'-6" to 3'-6" C/C
6.	Tie Beam	2"x1.5" Timber & 2" dia bamboo	Timber & Bamboo	@ 3'-0" to 4'-0" C/C (Alternate)
7.	Roof Beam	2.5"x3.5" Timber & 3" dia bamboo	Timber & Bamboo	@ 4'-0" C/C (Alternate)
8.	Wall Plate	2"x3"	Timber	
9.	Corner Bracing	1.5"x2"	Timber	Both top and bottom
10.	Fance (Top)		Bamboo Mat	
11.	Fance (Bottom)	0.25 mm	CGI Sheet	3' height
12.	Interior Post	3" dia	Bamboo	With <i>Katla</i>
13.	Corner Post	4"x4"x11'-0"	R C	4-8 mm Ø 1:2:4 Concrete
14.	Fance Supporting Post	2" dia	Bamboo	Without <i>Katla</i>
15.	Brick layer	3" Thick	Brick	One layer over mud plinth
16.	Door	3'-0"x6'-0"	Timber	Position may be changed
17.	Window	2'-7"x3"-6"	Timber	Position may be changed

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: TAHERPUR, SUNAMGONJ

TYPE: DP-2  
IKAR FENCE WITH MUD PLASTER

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRATERRE  
Grenoble, France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain  
2. Prof. Dr. Mohammad Shariful Islam

CRATERRE

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

MEMBER SCHEDULE

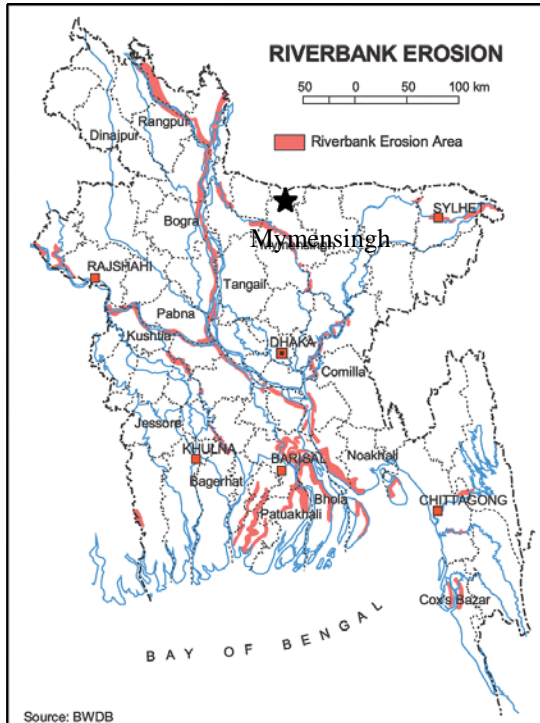
JULY, 2015

SHEET NO:

S - 06

## DIVISION: DHAKA

### 26. DESIGN OF LCH IN DHUBAURA: TYPE – 1



#### SITE TOPOGRAPHY



#### General Information:

##### Location:

District: Mymensingh

Upazila: Dhubaura

Union: Ghosegaun

Mouza/ Village: Bhalukapara

##### Climatic Feature: Dry and cold

Avg. Maximum Temperature: 33.5 °C

Avg. Minimum temperature: 12°C

Annual Rainfall: 2174 mm

Average Relative Humidity: 80%

##### Geotechnical Feature:

Topography: Plain land near river bank

MSL: 17 m

Soil Characteristics: Silt

##### Disaster:

Flash flood, River bank erosion, Northwester



**Completed House**

#### Design Considerations:

Available Building Materials: Mud, Bamboo, RC post, CGI sheets, Straw, Wood etc

Foundation: Bamboo posts/ *katla* embedded in soil (1-2 ft)

Plinth: Mud (two/three steps)

Post: RC and bamboo posts with *katla*/without *katla*

Fence/Wall: CGI sheet and bamboo mat (2 parts)

Openings: 1 main door + 1 inside door to connect rooms

Ceiling: Ceiling is considered to protect heat and cold

Treatment (bamboo & wood): Water treatment & partial chemical treatment Cost: Tk. 90,000

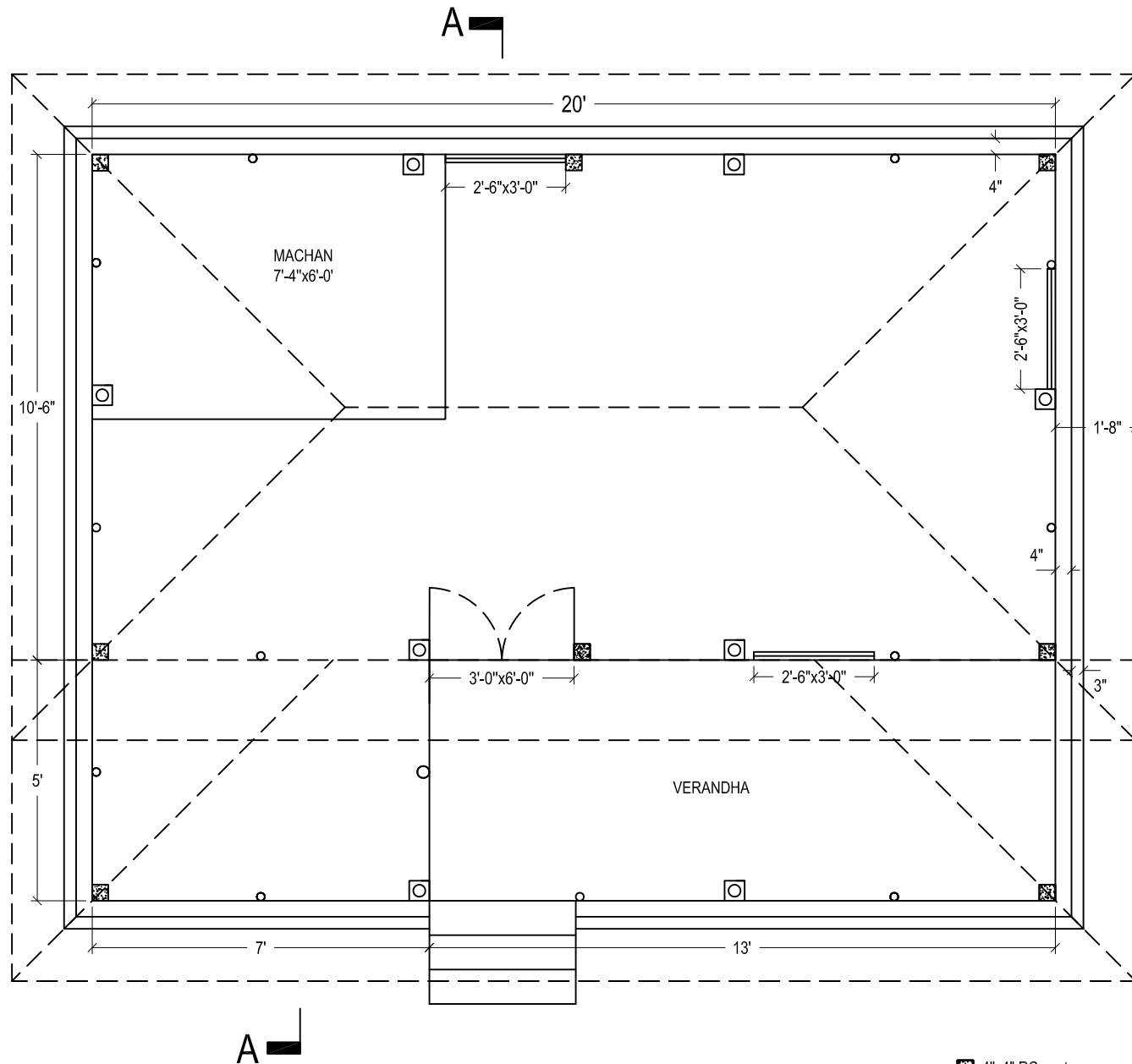
Roof Type: Four pitched & veranda  
roof is disconnected from main roof

Roof cover: CGI sheets

Roof structure: Wooden truss

Bracing: Corner bracing

Joints: Nails, notches, GI wire



PLAN

- 4"x4" RC post
- 2" Ø Bamboo post
- 5"x5" Katta with 3" Ø Bamboo post

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: DUBAURA, MYMENSINGH

TYPE-01: CGI SHEET HOUSE WITH  
FULL VERANHAH

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAtterre  
Grenoble, France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAtterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

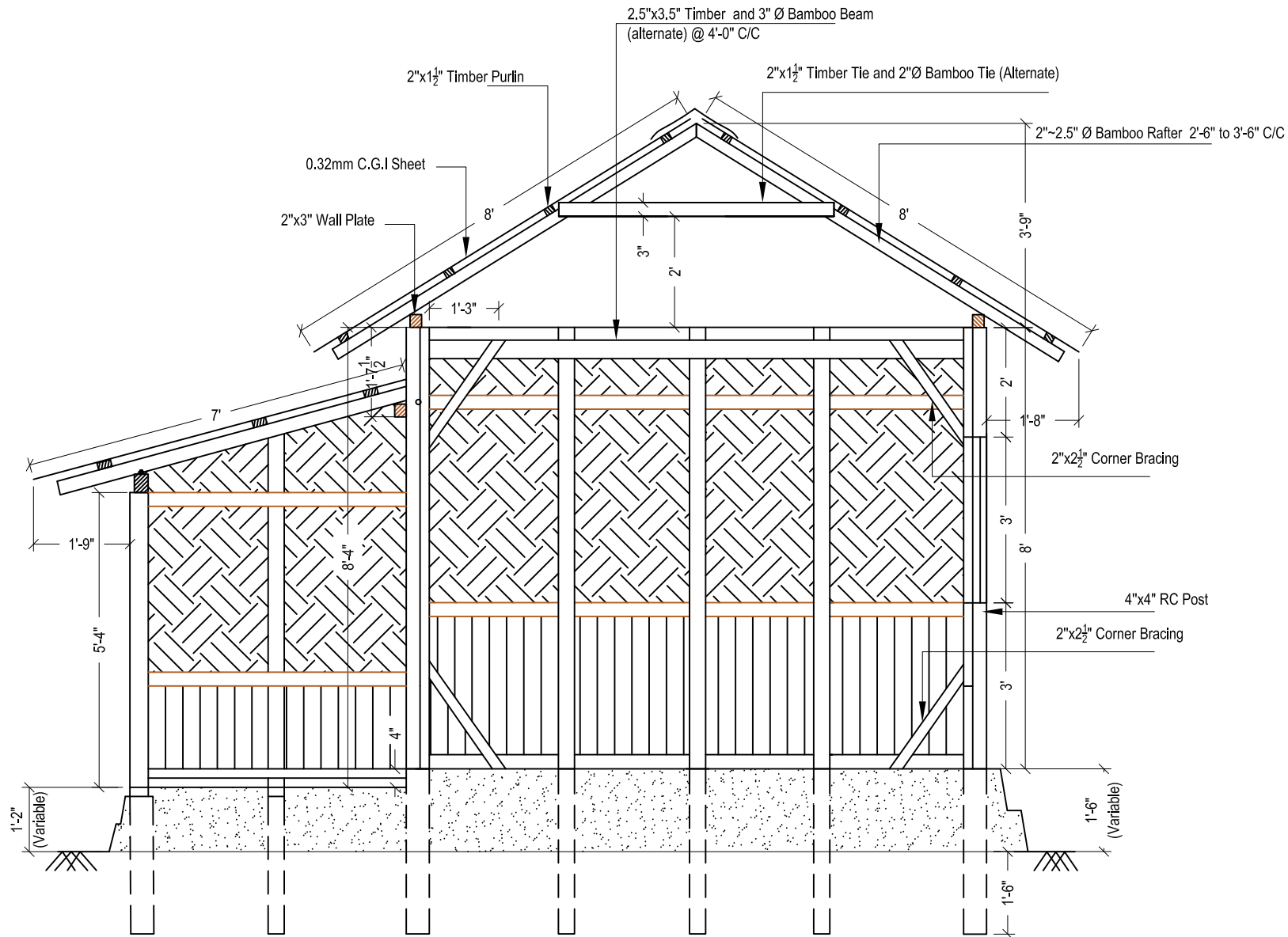
DRAWING TITLE:

PLAN

JULY, 2015

SHEET NO:

S - 01



SECTION: A - A

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: DUBAURA, MYMENSINGH

TYPE-01: CGI SHEET HOUSE WITH  
FULL VERANHAH

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRATERRE  
Grenoble, France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRATERRE

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

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LUXEMBOURG

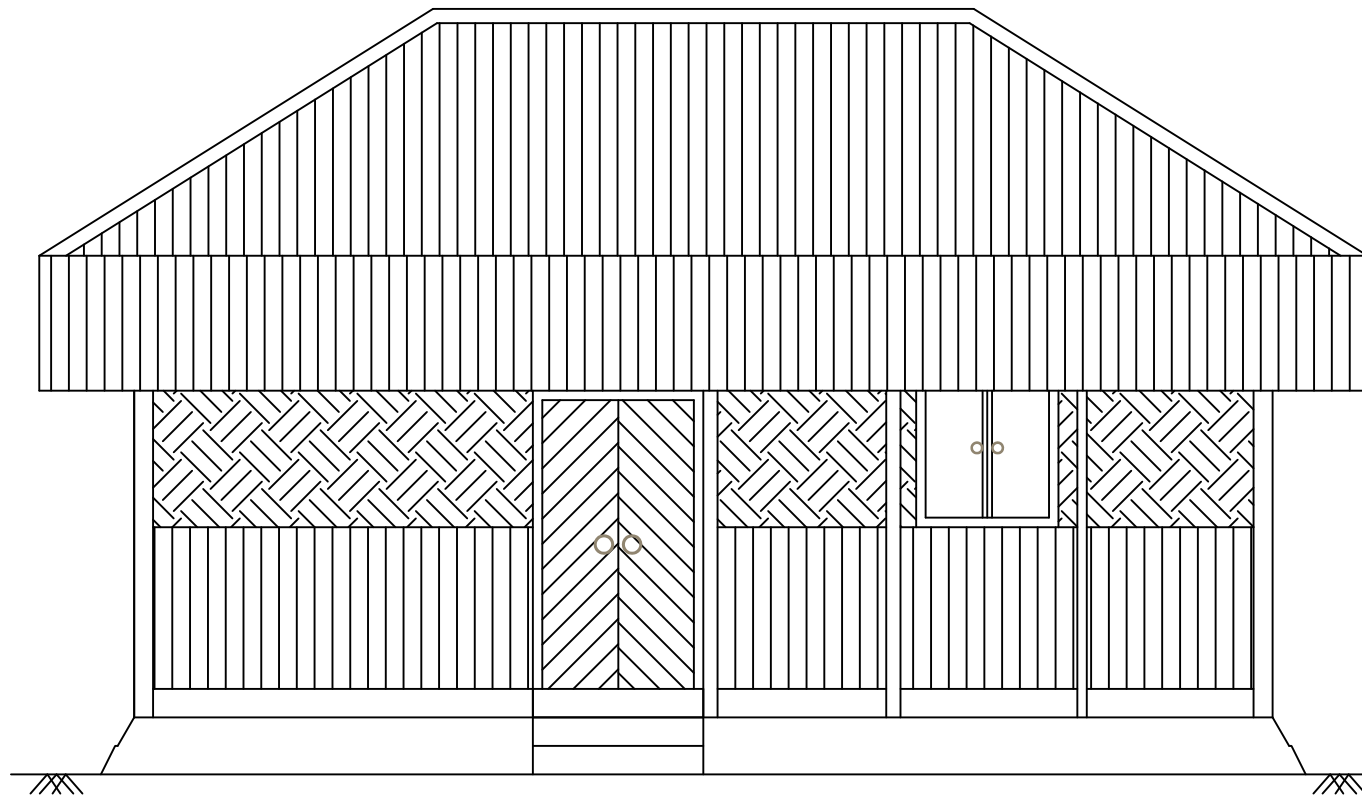
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SECTION: A - A

JULY, 2015

SHEET NO:

S - 02



FRONT ELEVATION

**PROJECT NAME :****CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)**

LOCATION: DUBAURA, MYMENSINGH

TYPE-01: CGI SHEET HOUSE WITH  
FULL VERANHAH**CONSULTANTS**DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France**DESIGN BY:****BUET**

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

**CRAterre**

3. Engr. Olivier Moles

**Caritas, Bangladesh**

1. Mr. Ratan Kumar Podder

**DRAWN BY:**

MD. ABU SAYED RASHED

**CLIENT****FUNDING AGENCIES**CARITAS  
BANGLADESH

CARITAS FRANCE

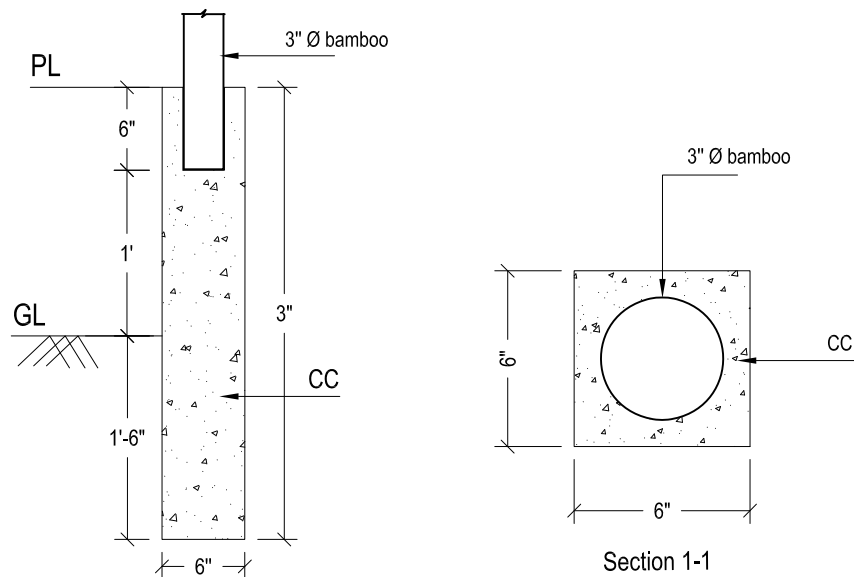
CARITAS  
LUXEMBOURG**DRAWING TITLE:**

FRONT ELEVATION

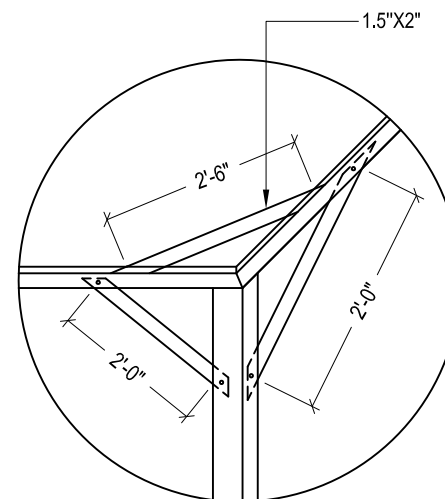
JULY, 2015

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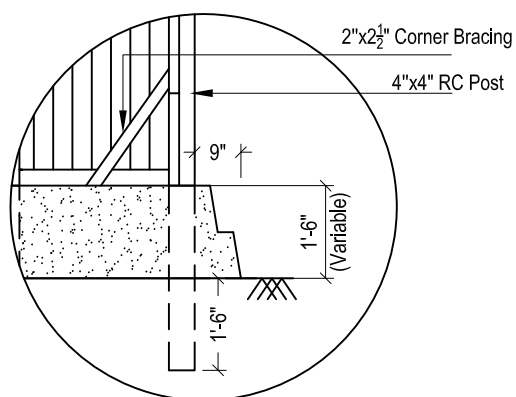
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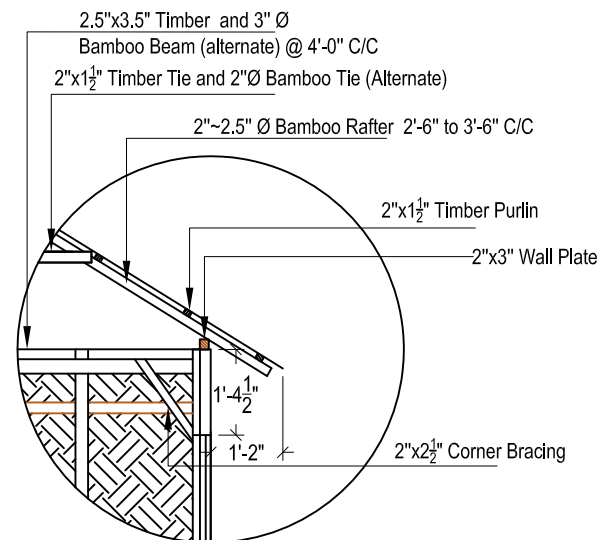
Detail 01: Bamboo into C C Katla



Detail 03: Corner Bracing



Detail 02: Plinth



Detail 04: Corner Bracing and Roof Arrangement

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: DUBAURA, MYMENSINGH

TYPE-01: CGI SHEET HOUSE WITH  
FULL VERANHAH

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAtterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain  
2. Prof. Dr. Mohammad Shariful Islam

CRAtterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

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BANGLADESH

FUNDING AGENCIES



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CARITAS  
LUXEMBOURG

DRAWING TITLE:

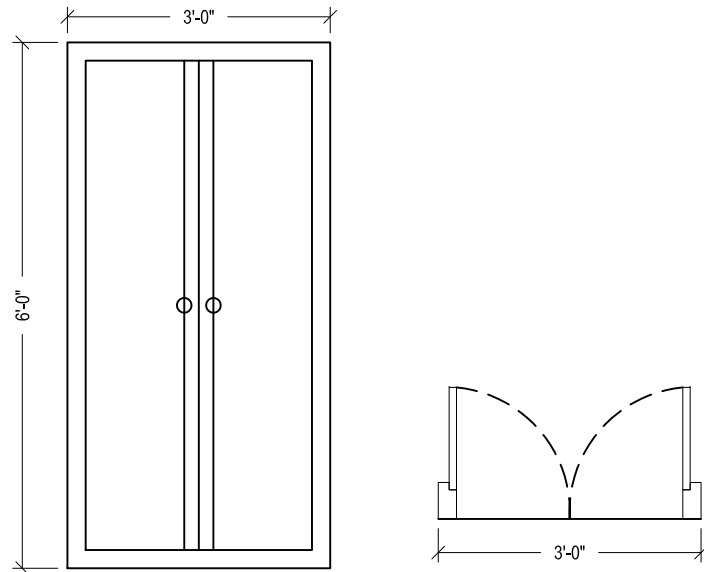
DETAIL DRAWING

JULY, 2015

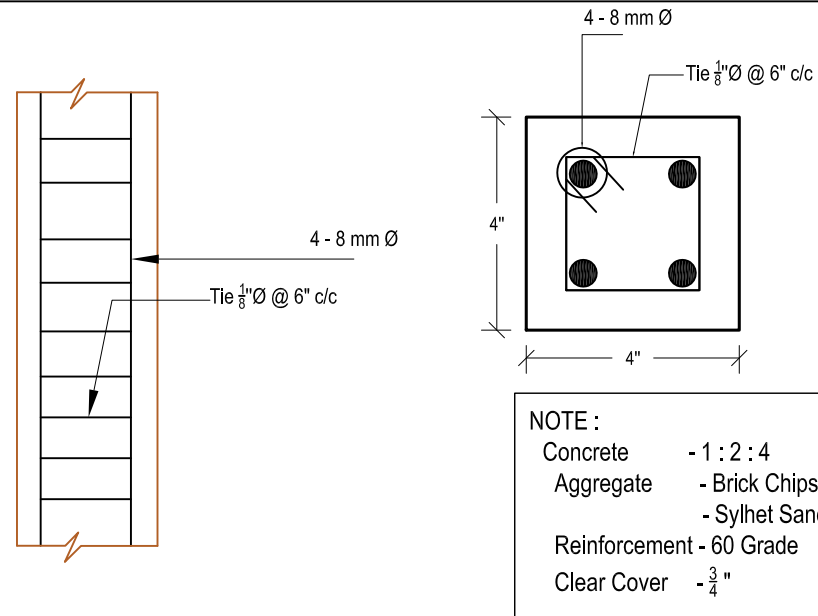
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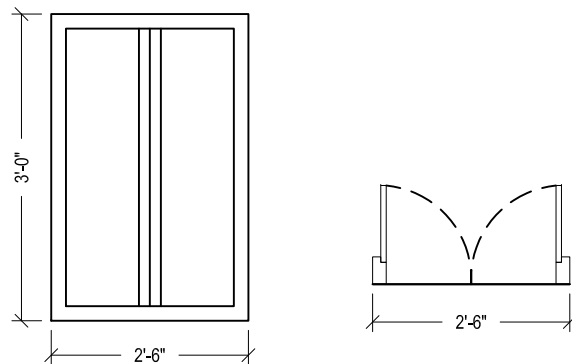




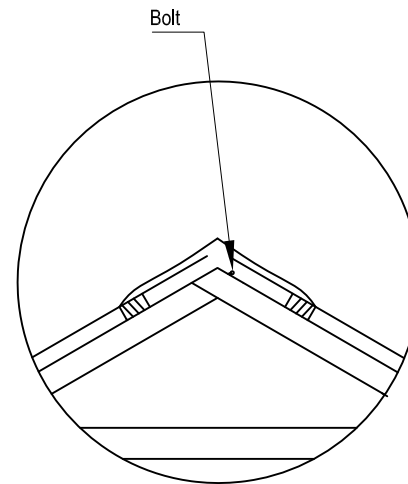
Detail 05: door



Detail 07: RC Post (Long Section &amp; Cross Section)



Detail 06: Window



Detail 08: Roof Top

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: DUBAURA, MYMENSINGH

TYPE-01: CGI SHEET HOUSE WITH  
FULL VERANHAH

CONSULTANTS



DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESH



ENSAG-CRATERRE  
Grenoble, France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain  
2. Prof. Dr. Mohammad Shariful Islam

CRATERRE

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

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BANGLADESH

FUNDING AGENCIES

Caritas France  
Secours Catholique

CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

DETAIL DRAWING

JULY, 2015

SHEET NO:

S - 05

MEMBER SCHEDULE				
SL.	ITEMS NAME	DIMENSIONS	MATERIALS NAME	REMARKS
1.	Roof Cover	0.32 mm	CGI Sheet	
2.	Purlin	2"x1.5"	Timber	@ 2'-6" C/C
3.	Rafter	2" to 2.5" dia	Bamboo	@ 2'-6" TO 3'-6" C/C
4.	Center Rafter	2"x2.5"	Timber	
5.	Tie	2"x1.5" Timber & 2" dia bamboo	Timber & Bamboo	@ 3'-0" to 4'-0" C/C (Alternate)
6.	Roof Beam	2.5"x3.5" Timber & 3" dia bamboo	Timber & Bamboo	@ 4'-0" C/C (Alternate)
7.	Wall Plate	2"x3"	Timber	
8.	Corner Bracing	2"x2.5"	Timber	Both top and bottom
9.	Fance (Top)		Bamboo Mat	
10.	Fance (Bottom)	0.25 mm	CGI Sheet	3' height
11.	Interior Post	3" dia	Bamboo	With <i>Katla</i>
12.	Corner Post	4"x4"x11'-0"	R C	4-8 mm Ø 1:2:4 Concrete
13.	Fance Supporting Post	2" dia	Bamboo	Without <i>Katla</i>
14.	Door	3'-0"x6'-0"	Timber	Position may be changed
15.	Window	2'-6"x3'-0"	Timber	Position may be changed

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: DUBAURA, MYMENSINGH

TYPE-01: CGI SHEET HOUSE WITH  
FULL VERANHAH

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRATERRE  
Grenoble, France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain  
2. Prof. Dr. Mohammad Shariful Islam

CRATERRE

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

CARITAS  
BANGLADESH

FUNDING AGENCIES



CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

MEMBER SCHEDULE

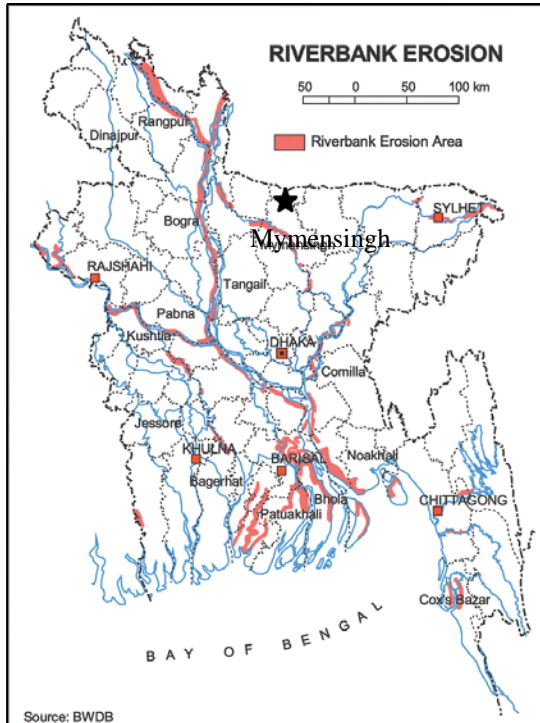
JULY, 2015

SHEET NO:

S - 06

## DIVISION: DHAKA

### 27. DESIGN OF LCH IN DHUBAURA: TYPE – 2



#### SITE TOPOGRAPHY



#### General Information:

##### Location:

District: Mymensingh

Upazila: Dhubaura

Union: Ghosegaun

Mouza/ Village: Rajpur

##### Climatic Feature: Dry and cold

Avg. Maximum Temperature: 33.5 °C

Avg. Minimum temperature: 12°C

Annual Rainfall: 2174 mm

Average Relative Humidity: 80%

##### Geotechnical Feature:

Topography: Plain land near river bank

MSL: 17 m

Soil Characteristics: Silt

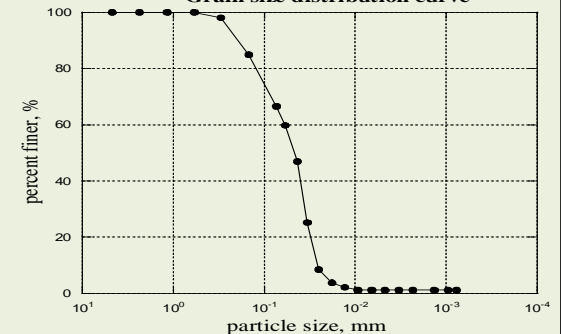
##### Disaster:

Flash flood, River bank erosion, Northwester



#### Completed House

##### Grain size distribution curve



#### Design Considerations:

Available Building Materials: Mud, Bamboo, RC post, CGI sheets, Straw, Wood etc

Foundation: Bamboo posts/ *katla* embedded in soil (1-2 ft)

Plinth: Mud (two/three steps)

Post: RC and bamboo posts with *katla*/without *katla*

Fence/Wall: CGI sheet and bamboo mat (2 parts)

Openings: 1 main door

Ceiling: Ceiling is considered to protect heat and cold

Treatment (bamboo & wood): Water treatment & partial chemical treatment

Roof Type: Four pitched & veranda

roof is disconnected from main roof

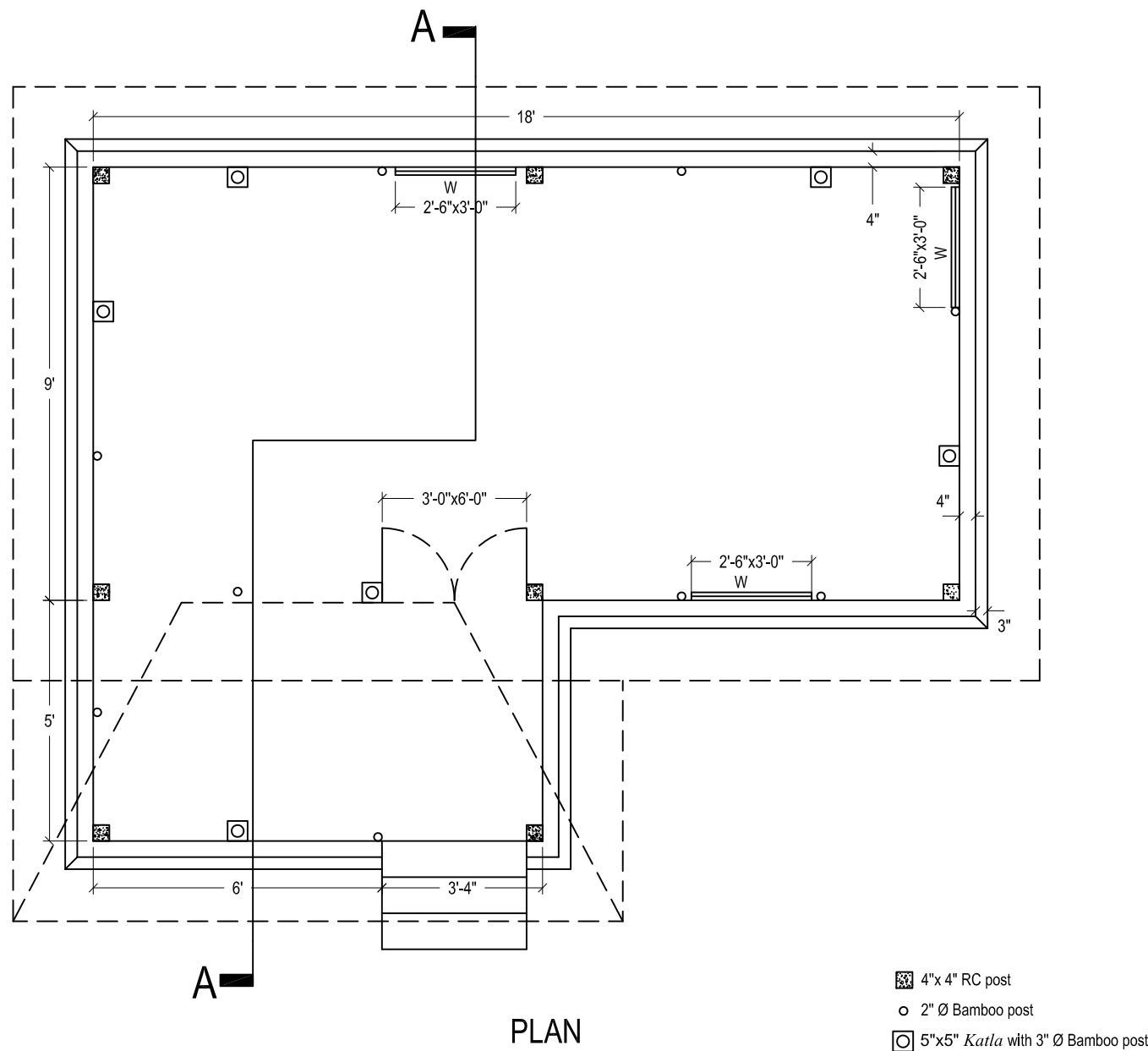
Roof cover: CGI sheets

Roof structure: Wooden/ bamboo truss

Bracing: Corner bracing

Joints: Nails, notches, GI wire

Cost: Tk. 85,000



PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: DHUBAURA , MYMENSINGH

TYPE 02 : CGI Sheet House with Half Verandah

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAtterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAtterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

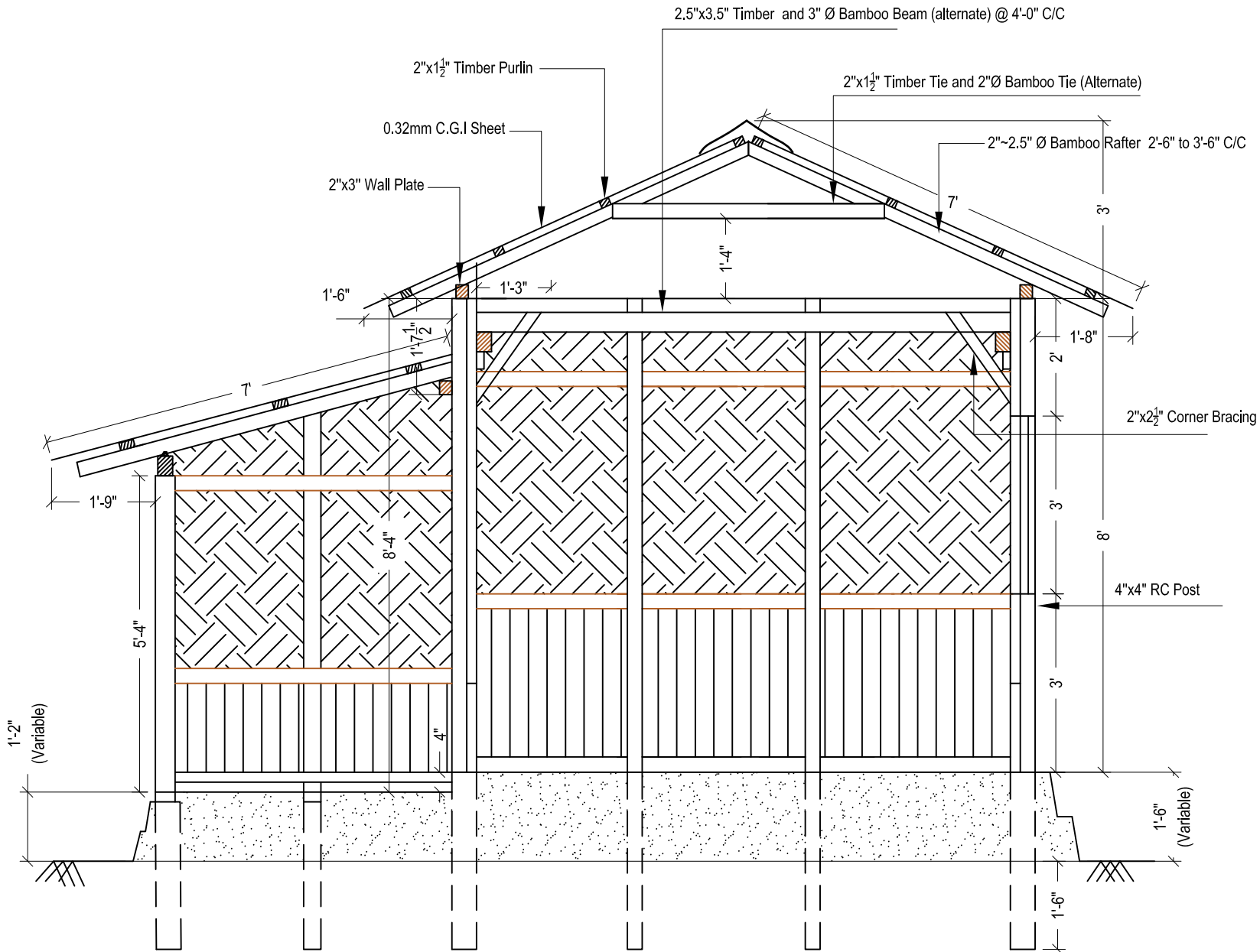
DRAWING TITLE:

PLAN

JULY, 2015

SHEET NO:

S - 01



SECTION: A - A

**PROJECT NAME :**

### CONSTRUCTION OF PILOT LOW COST HOUSES (LCH)

LOCATION: DHUBAURA , MYMENSINGH

TYPE 02 : CGI Sheet House with Half Verandah

CONSULTANTS



DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESH

ENSAG-CRAterre  
Grenoble, France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

- ### 3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

CARITAS  
BANGLADESH

FUNDING AGENCIES
------------------



CARITAS FRANCE

CARITAS  
LUXEMBOURG

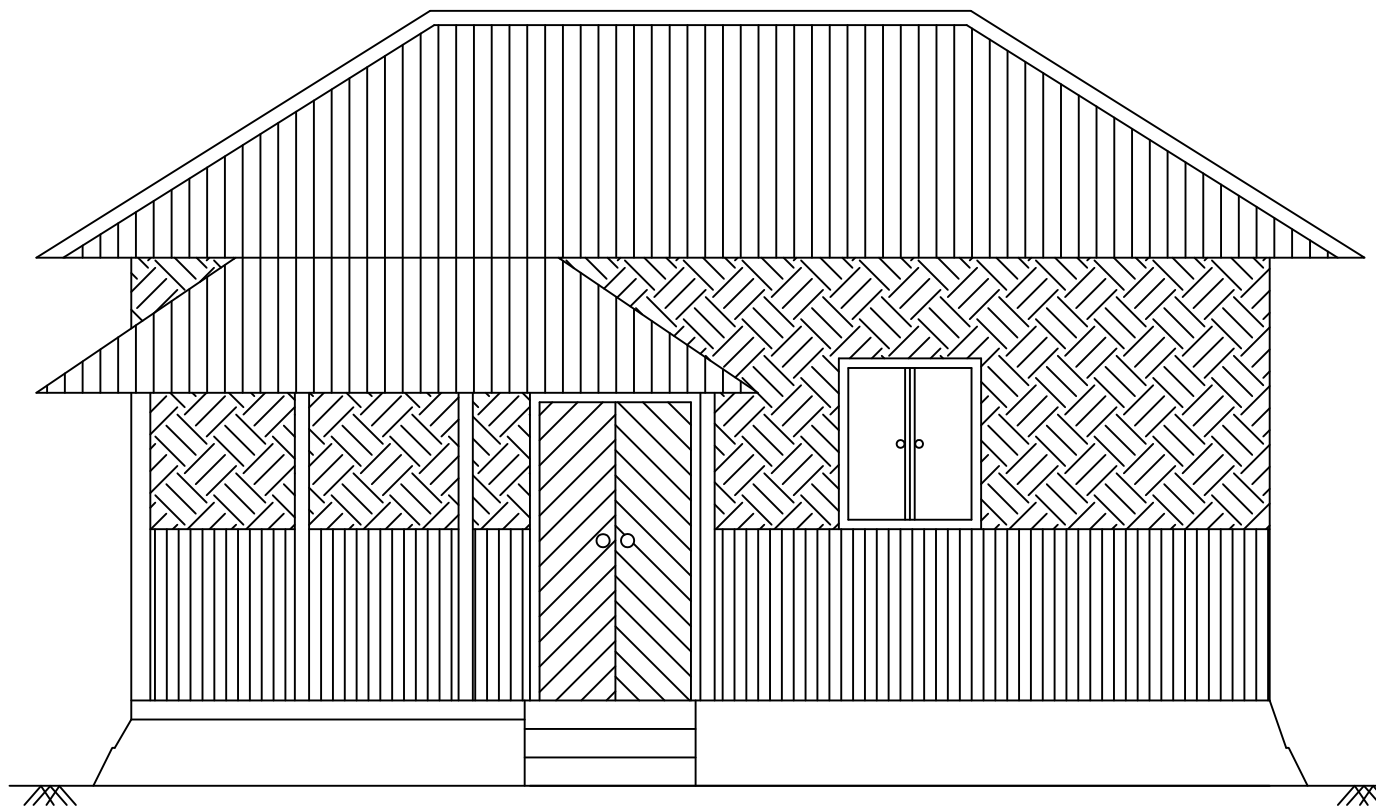
DRAWING TITLE:

SECTION: A - A

JULY, 2015

SHEET NO:

S - 02



FRONT ELEVATION

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: DHUBAURA , MYMENSINGH

TYPE 02 : CGI Sheet House with Half Verandah

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

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FUNDING AGENCIES

CARITAS  
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CARITAS  
LUXEMBOURG

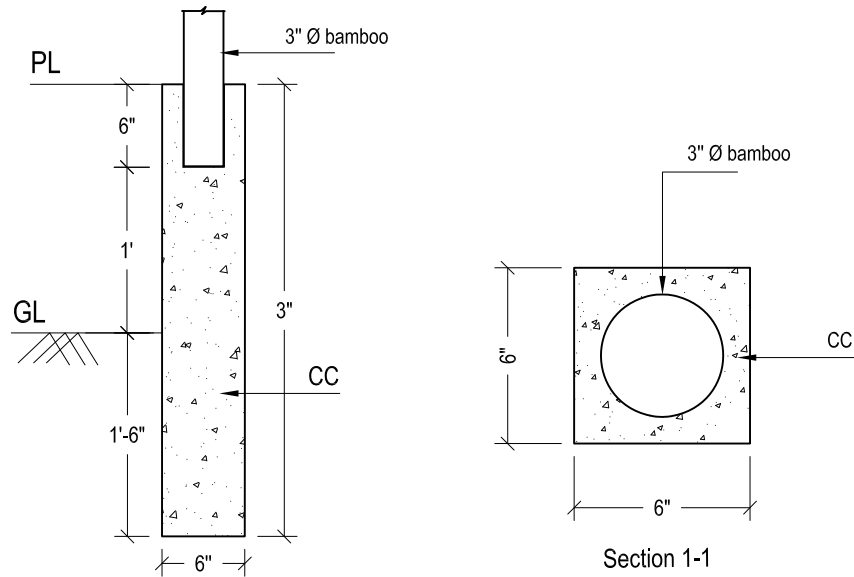
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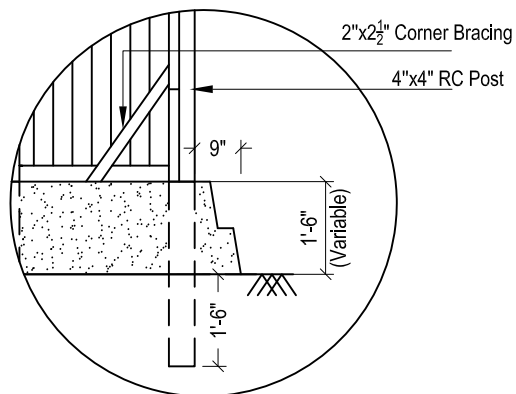
JULY, 2015

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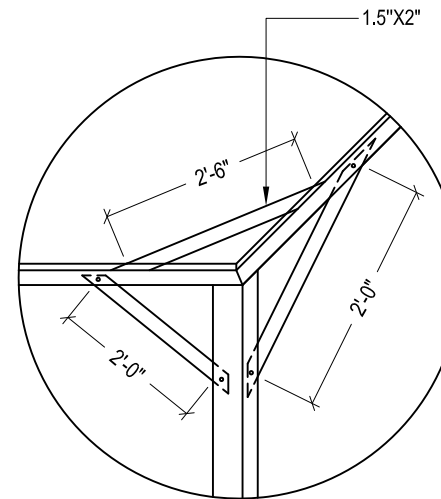
S - 03



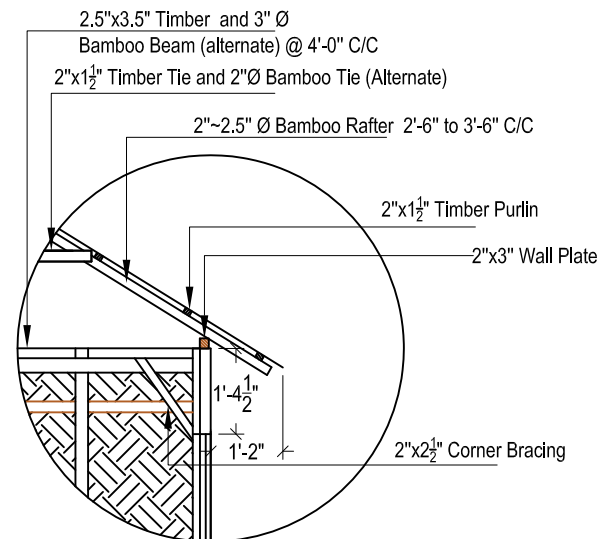
Detail 01: Bamboo into C C Katla



Detail 02: Plinth



Detail 03: Corner Bracing



Detail 04: Corner Bracing and Roof Arrangement

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: DHUBAURA , MYMENSINGH

TYPE 02 : CGI Sheet House with Half Verandah

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

CARITAS  
BANGLADESH

FUNDING AGENCIES



CARITAS FRANCE

CARITAS  
LUXEMBOURG

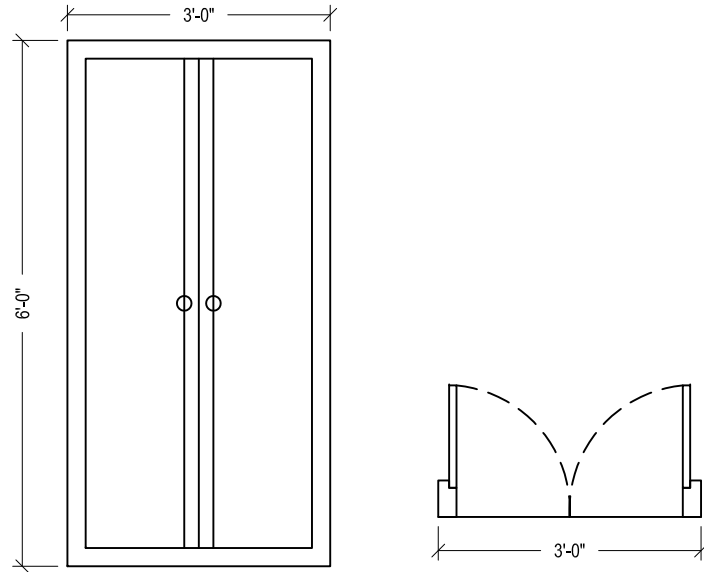
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DETAIL DRAWING

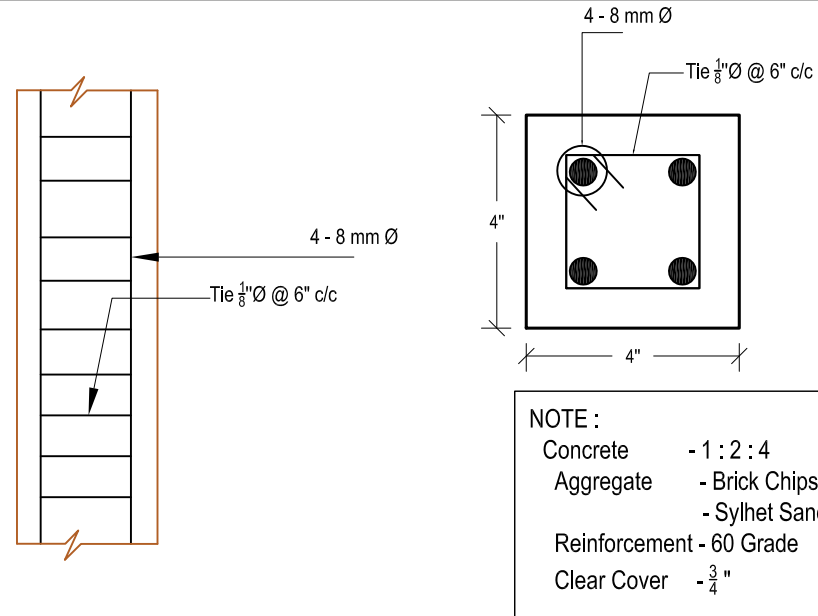
JULY, 2015

SHEET NO:

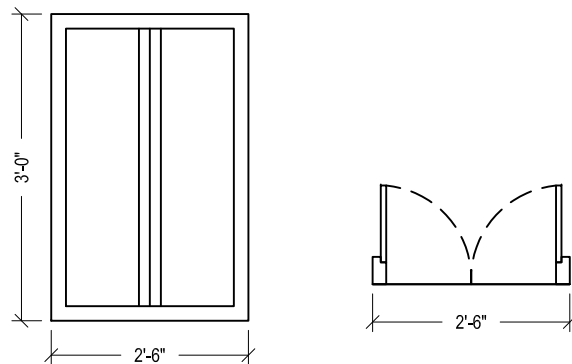
S - 05



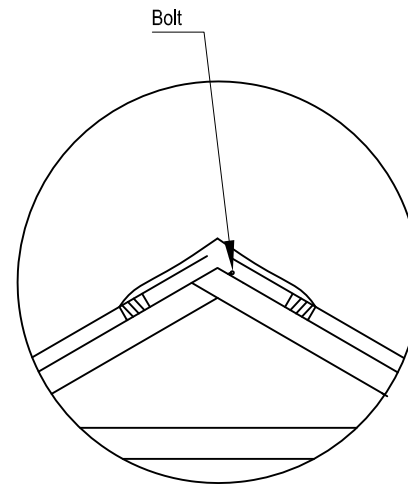
Detail 05: Door



Detail 07: RC Post (Long Section &amp; Cross Section)



Detail 06: Window



Detail 08: Roof Top

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: DHUBAURA , MYMENSINGH

TYPE 02 : CGI Sheet House with Half Verandah

CONSULTANTS



DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESH



ENSAG-CRATERRE  
Grenoble, France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain  
2. Prof. Dr. Mohammad Shariful Islam

CRATERRE

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

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CARITAS  
BANGLADESH

FUNDING AGENCIES

Caritas France  
Secours Catholique

CARITAS FRANCE



CARITAS  
LUXEMBOURG

DRAWING TITLE:

DETAIL DRAWING

JULY, 2015

SHEET NO:

S - 06



MEMBER SCHEDULE				
SL.	ITEMS NAME	DIMENSIONS	MATERIALS NAME	REMARKS
1.	Roof Cover	0.32 mm	CGI Sheet	
2.	Purlin	2"x1.5"	Timber	@ 2'-6" C/C
3.	Rafter	2" to 2.5" dia	Bamboo	@ 2'-6" TO 3'-6" C/C
4.	Center Rafter	2"x2.5"	Timber	
5.	Tie	2"x1.5" Timber & 2" dia bamboo	Timber & Bamboo	@ 3'-0" to 4'-0" C/C (Alternate)
6.	Roof Beam	2.5"x3.5" Timber & 3" dia bamboo	Timber & Bamboo	@ 4'-0" C/C (Alternate)
7.	Wall Plate	2"x3"	Timber	
8.	Corner Bracing	2"x2.5"	Timber	Both top and bottom
9.	Fence (Top)		Bamboo Mat	
10.	Fence (Bottom)	0.25 mm	CGI Sheet	3' height
11.	Interior Post	3" dia	Bamboo	With <i>Katla</i>
12.	Corner Post	4"x4"x11'-0"	R C	4-8 mm Ø 1:2:4 Concrete
13.	Fence Supporting Post	2" dia	Bamboo	Without <i>Katla</i>
14.	Door	3'-0"x6'-0"	Timber	Position may be changed
15.	Window	2'-6"x3'-0"	Timber	Position may be changed

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: DHUBAURA , MYMENSINGH

TYPE 02 : CGI Sheet House with Half Verandah

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRATERRE  
Grenoble, France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain  
2. Prof. Dr. Mohammad Shariful Islam

CRATERRE

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

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CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

MEMBER SCHEDULE

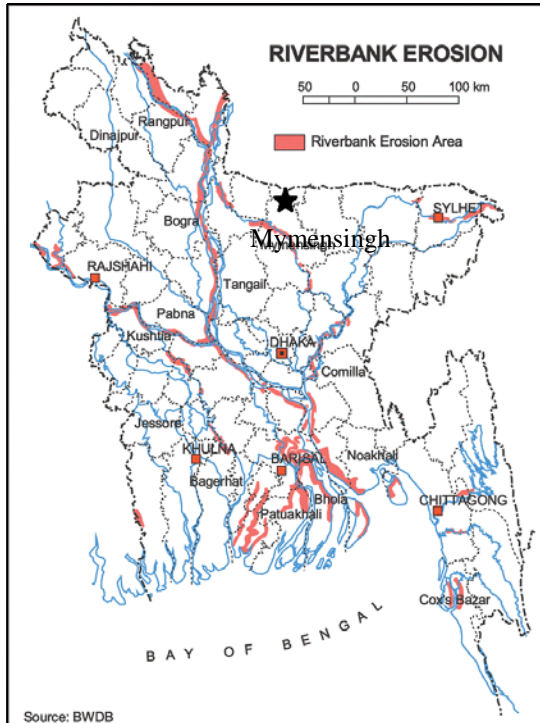
JULY, 2015

SHEET NO:

S - 07

## DIVISION: DHAKA

### 28. DESIGN OF LCH IN DHUBAURA: TYPE – DP 1



#### SITE TOPOGRAPHY



#### General Information:

##### Location:

District: Mymensingh

Upazila: Dhubaura

Union: Ghosegaun

Mouza/ Village: Rajpur

##### Climatic Feature: Dry and cold

Avg. Maximum Temperature: 33.5 °C

Avg. Minimum temperature: 12°C

Annual Rainfall: 2174 mm

Average Relative Humidity: 80%

##### Geotechnical Feature:

Topography: Plain land near river bank

MSL: 17 m

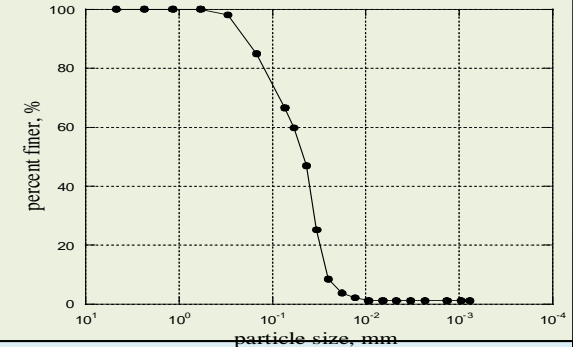
Soil Characteristics: Silt

##### Disaster:

Flash flood, River bank erosion, Northwester



**Completed House**  
Grain size distribution curve



#### Design Considerations:

Available Building Materials: Mud, Bamboo, RC post, CGI sheets, Straw, Wood etc

Foundation: Bamboo posts/ *katla* embedded in soil (1-2 ft)

Plinth: Mud (two/three steps)

Post: RC and bamboo posts with *katla*/without *katla*

Fence/Wall: CGI sheet and bamboo mat (2 parts)

Openings: 1 main door

Ceiling: Ceiling is considered to protect heat and cold

Treatment (bamboo & wood): Water treatment & partial chemical treatment

Roof Type: Four pitched & veranda  
roof is disconnected from main roof

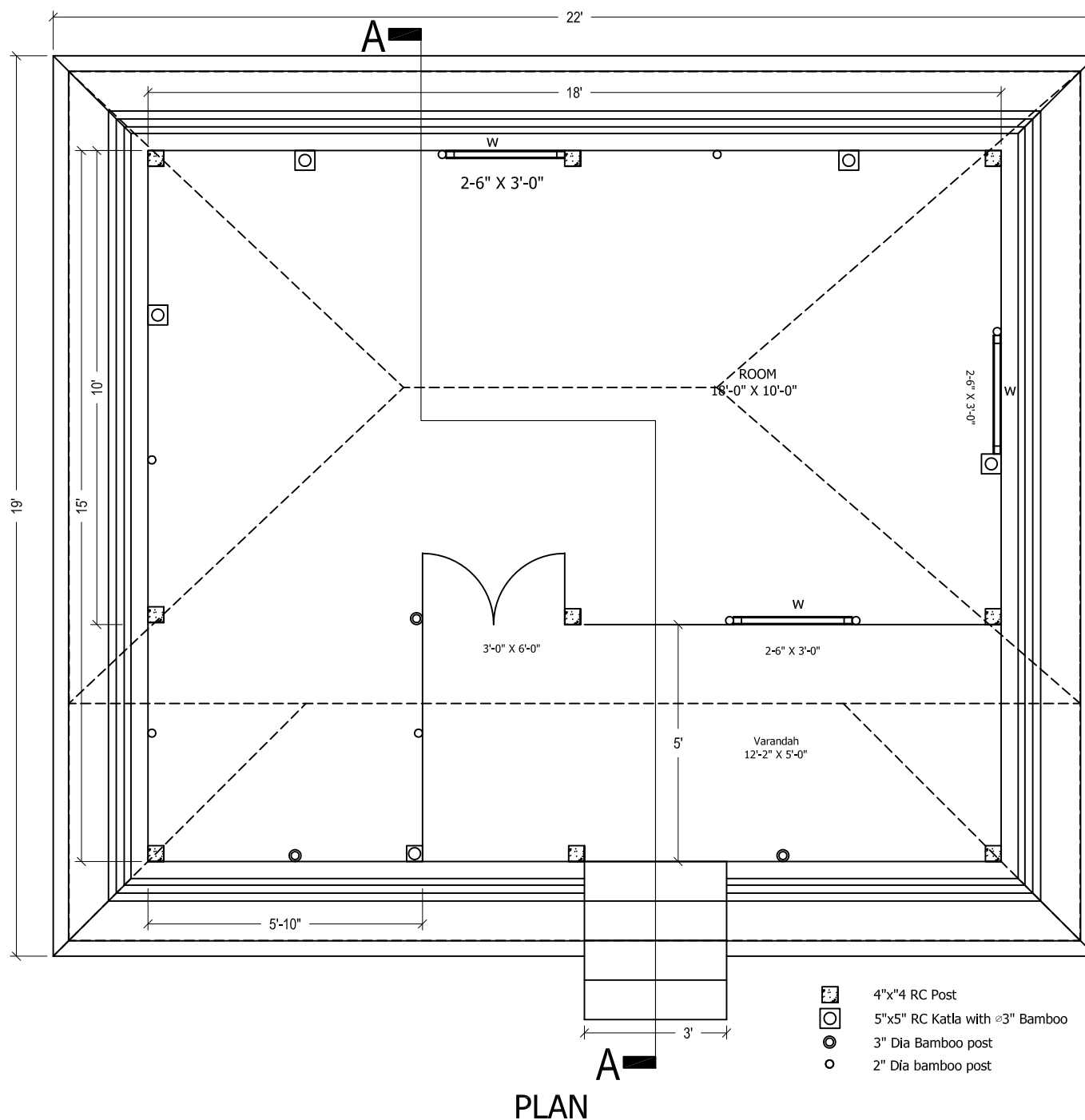
Roof cover: CGI sheets

Roof structure: Wooden/ bamboo truss

Bracing: Corner bracing

Joints: Nails, notches, GI wire

Cost: Tk. 85,000



PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: DHOBAURA, MYMENSINGH

TYPE - DP-1 :  
C.G.I. Sheet House with Half Varandah

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble, France

DESIGN BY:

BUET

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2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

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LUXEMBOURG

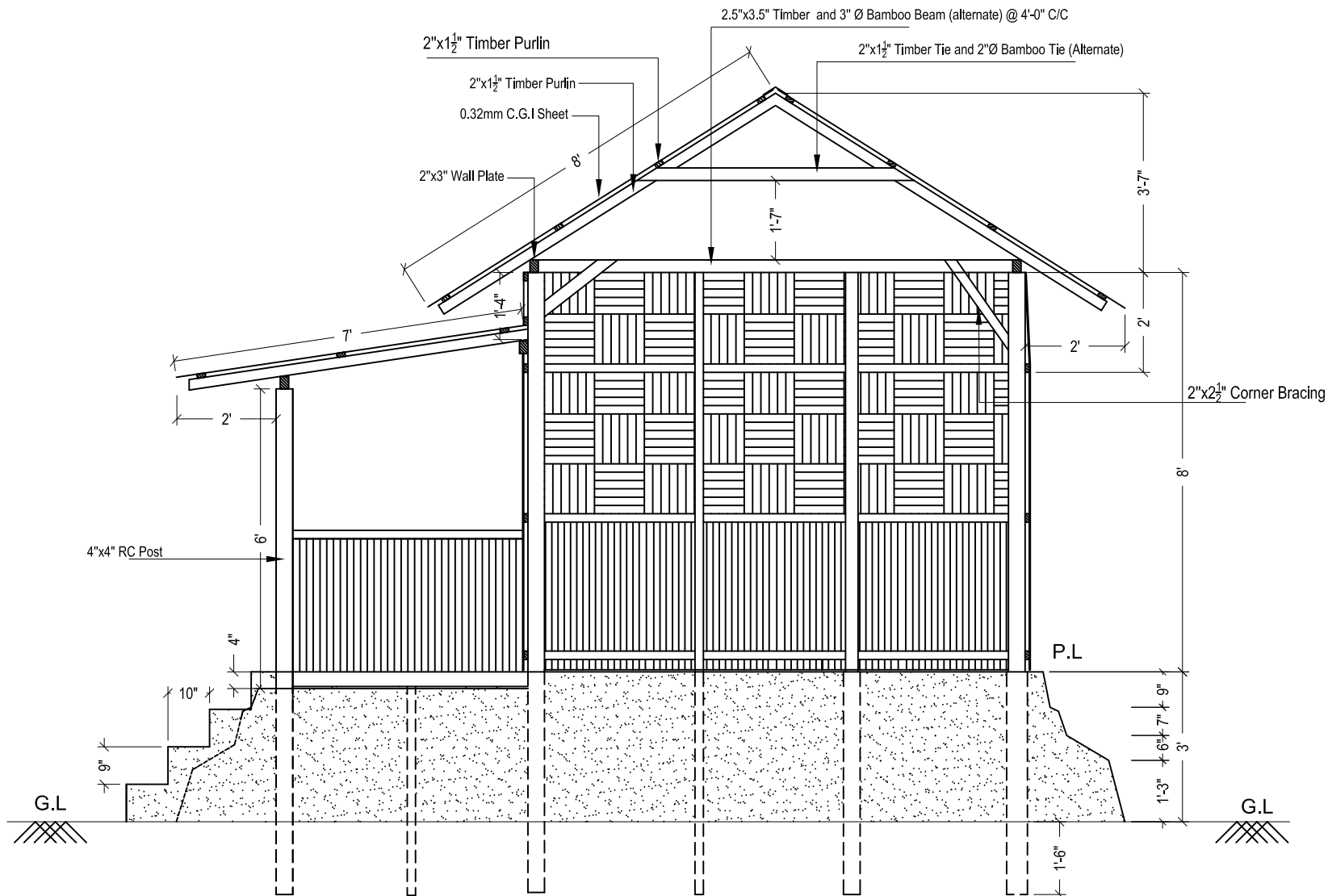
DRAWING TITLE:

GROUND FLOOR PLAN

JULY, 2015

SHEET NO:

S - 01



SECTION-AA

wall plate-2"x3"  
 Rafter- 2"x 2.5"  
 Purlin- 2"x 1"  
 Betton-2"x 1"

PROJECT NAME :

CONSTRUCTION OF PILOT  
 LOW COST HOUSES (LCH)

LOCATION: DHOBAURA, MYMENSINGH

TYPE - DP-1 :  
 C.G.I. Sheet House with Half Varandah

CONSULTANTS



DEPARTMENT OF  
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 BRTC, BUET, DHAKA  
 BANGLADESH



ENSAG-CRATERRE  
 Grenoble, France

DESIGN BY:

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CRATERRE

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

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CARITAS  
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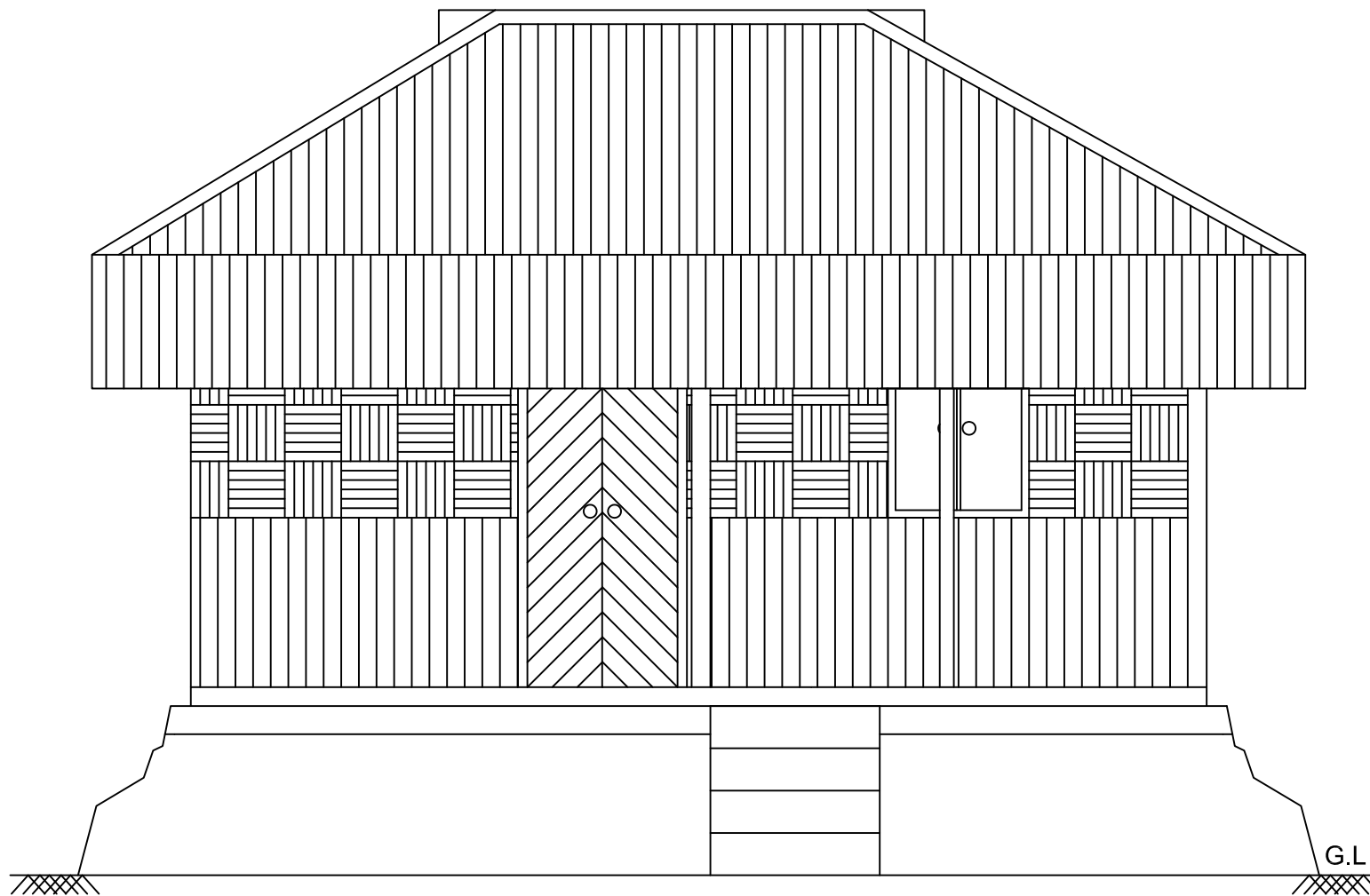
DRAWING TITLE:

SECTION-A A

JULY, 2015

SHEET NO:

S - 02



FRONT ELEVATION

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: DHOBAURA, MYMENSINGH

TYPE - DP-1 :  
C.G.I. Sheet House with Half Varandah

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

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CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

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FUNDING AGENCIES

CARITAS  
BANGLADESH

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CARITAS  
LUXEMBOURG

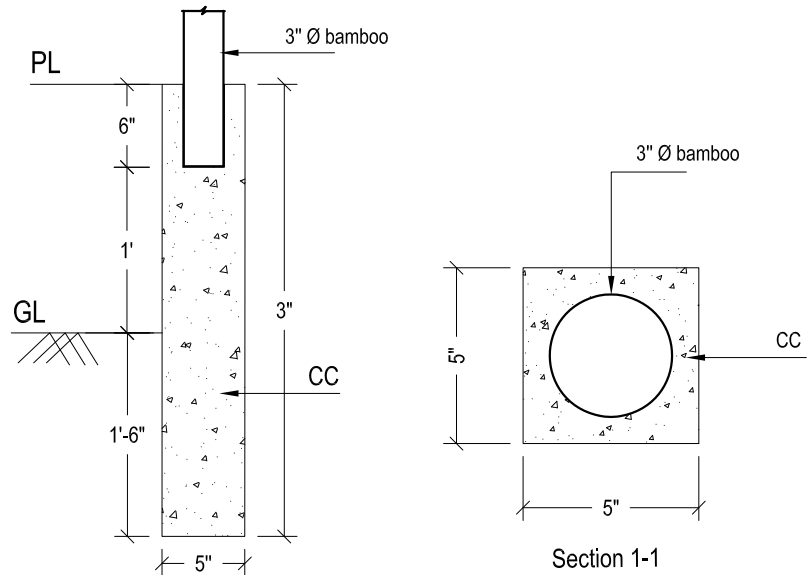
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FRONT ELEVATION

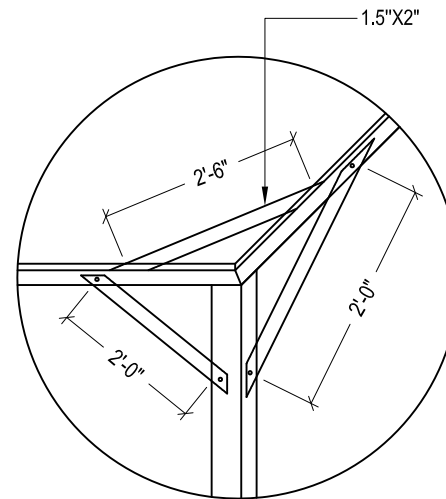
JULY, 2015

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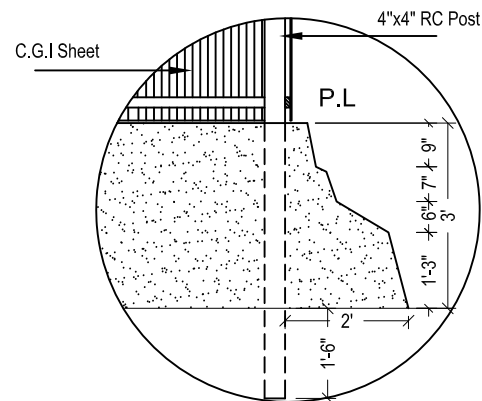
S - 03



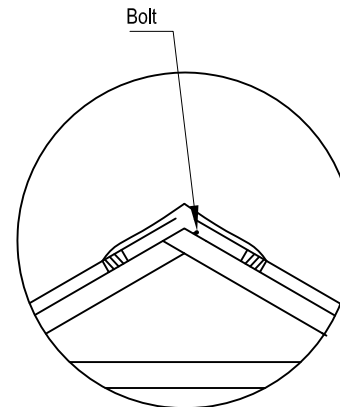
Detail 01: Bamboo into C C Katla



Detail 03: Corner Bracing



Detail 02: Plinth



Detail 04: Roof Top

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: DHOBAURA, MYMENSINGH

TYPE - DP-1 :  
C.G.I. Sheet House with Half Varandah

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

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CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

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CARITAS FRANCE

CARITAS  
LUXEMBOURG

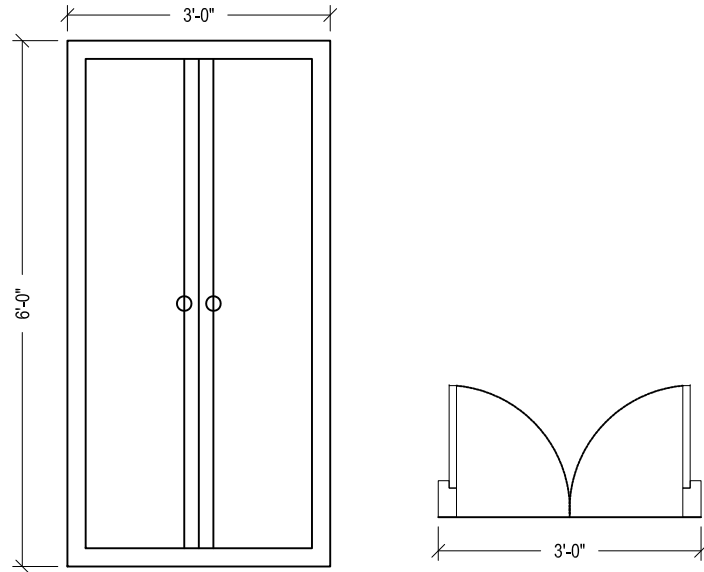
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DETAIL DRAWING

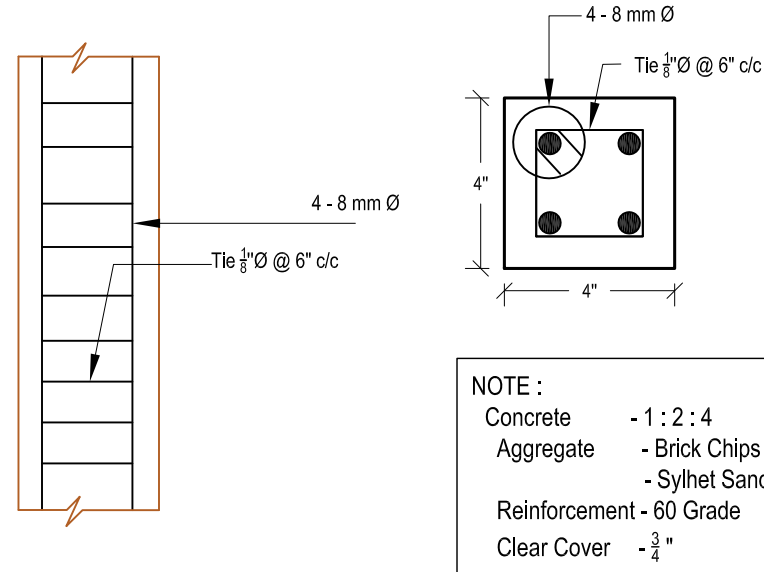
JULY, 2015

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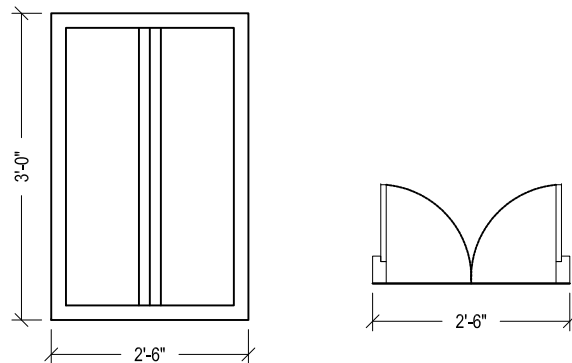
S - 04



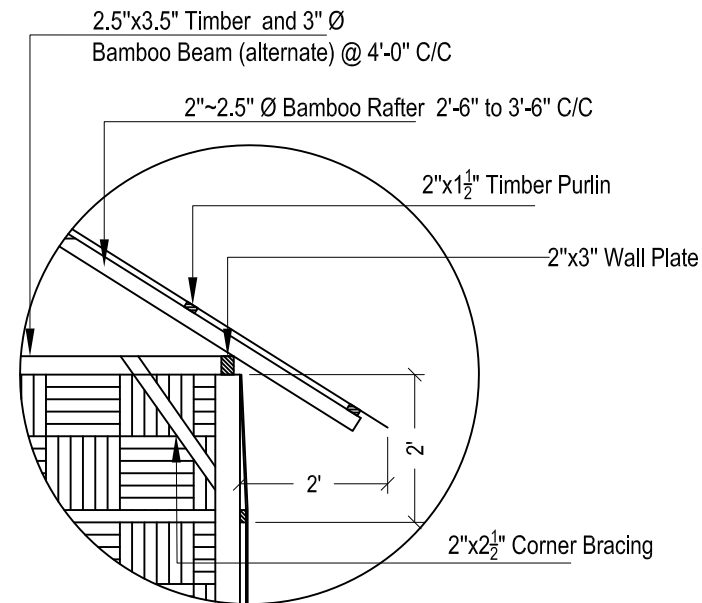
Detail 05: door



Detail 07: RC Post (Long Section &amp; Cross Section)



Detail 06: Window



Detail 08: Corner Bracing and Roof Arrangement

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: DHOBAURA, MYMENSINGH

TYPE - DP-1 :  
C.G.I. Sheet House with Half Varandah

CONSULTANTS



DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESH



ENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain  
2. Prof. Dr. Mohammad Shariful Islam

CRAAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

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CLIENT

CARITAS  
BANGLADESH

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LUXEMBOURG

DRAWING TITLE:

DETAIL DRAWING

JULY, 2015

SHEET NO:

S - 05

MEMBER SCHEDULE				
SL.	ITEMS NAME	DIMENSIONS	MATERIALS NAME	REMARKS
1.	Roof Cover	0.32 mm	CGI Sheet	
2.	Purlin	2"x1.5"	Timber	@ 2'-6" C/C
3.	Rafter	2" to 2.5" dia	Bamboo	@ 2'-6" TO 3'-6" C/C
4.	Center Rafter	2"x2.5"	Timber	
5.	Tie	2"x1.5" Timber & 2" dia bamboo	Timber & Bamboo	@ 3'-0" to 4'-0" C/C (Alternate)
6.	Roof Beam	2.5"x3.5" Timber & 3" dia bamboo	Timber & Bamboo	@ 4'-0" C/C (Alternate)
7.	Wall Plate	2"x3"	Timber	
8.	Corner Bracing	2"x2.5"	Timber	Both top and bottom
9.	Fence (Top)		Bamboo Mat	
10.	Fence (Bottom)	0.25 mm	CGI Sheet	3' height
11.	Interior Post	3" dia	Bamboo	With <i>Katla</i>
12.	Corner Post	4"x4"x11'-0"	R C	4-8 mm Ø 1:2:4 Concrete
13.	Fance Supporting Post	2" dia	Bamboo	Without <i>Katla</i>
14.	Door	3'-0"x6'-0"	Timber	Position may be changed
15.	Window	2'-6"x3"-0"	Timber	Position may be changed

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: DHOBAURA, MYMENSINGH

TYPE - DP-1 :  
C.G.I. Sheet House with Half Varandah

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain  
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

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CLIENT

CARITAS  
BANGLADESH

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LUXEMBOURG

DRAWING TITLE:

MEMBER SCHEDULE

JULY, 2015

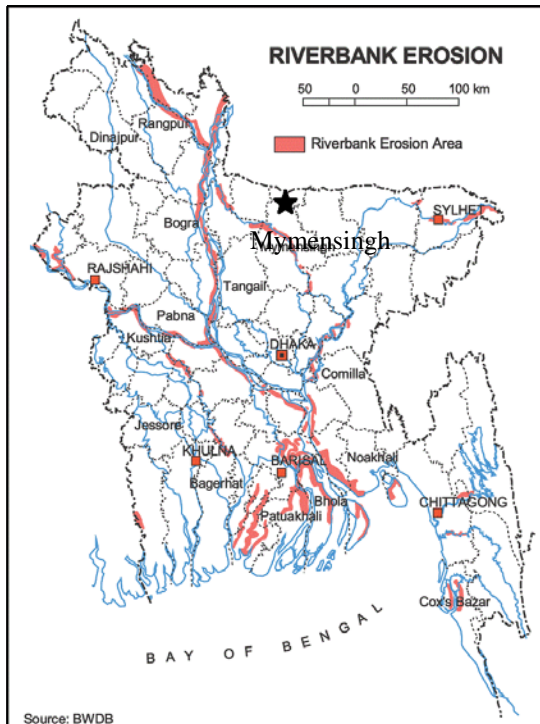
SHEET NO:

S - 06



## DIVISION: DHAKA

### 29. DESIGN OF LCH IN KALMAKANDA: TYPE – DP 2



#### General Information:

##### Location:

District: Netrokona  
Upazila: Kalmakanda  
Union: Rongchati  
Mouza/ Village: Noyachoita

##### Climatic Feature:

Avg. Maximum Temperature: 33.5 °C  
Avg. Minimum temperature: 12°C  
Annual Rainfall: 2174 mm  
Average Relative Humidity: 80%

##### Geotechnical Feature:

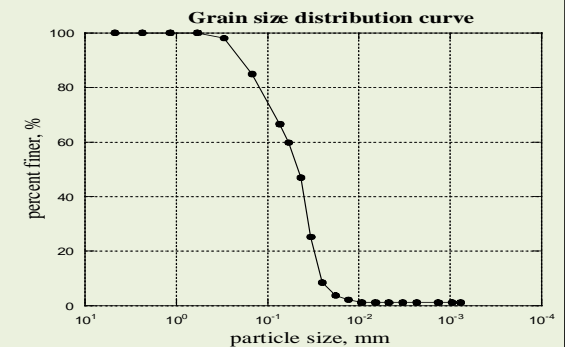
Topography: Plain land near river bank  
MSL: 17 m  
Soil Characteristics: Loamy

##### Disaster:

Flash flood, River bank erosion, Northwester



Completed House



#### Design Considerations:

Available Building Materials: Mud, Bamboo, RC post, CGI sheets, Straw, Wood etc

Foundation: Bamboo posts/ *katla* embedded in soil (1-2 ft)

Plinth: Mud (two/three steps)

Post: RC and bamboo posts with *katla*/without *katla*

Fence/Wall: CGI sheet and bamboo mat (2 parts)

Openings: 1 main door

Ceiling: Ceiling is considered to protect heat and cold

Treatment (bamboo & wood): Water treatment & partial chemical treatment

Roof Type: Four pitched & veranda  
roof is disconnected from main roof

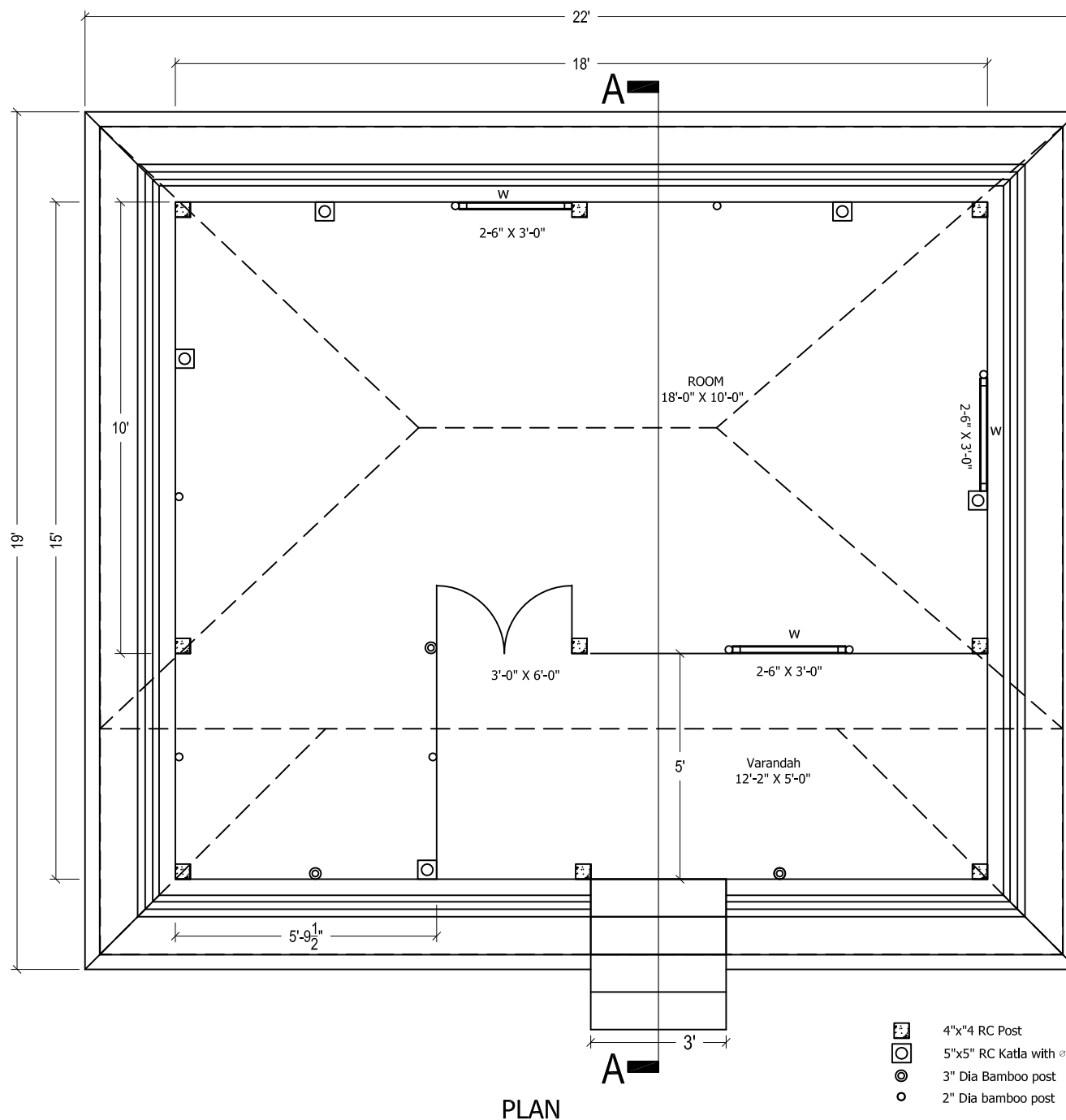
Roof cover: CGI sheets

Roof structure: Wooden/ bamboo truss

Bracing: Corner bracing

Joints: Nails, notches, GI wire

Cost: Tk. 85,000



PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: KALMAKANDA, MYMENSINGH

TYPE - DP-2 :  
C.G.I. Sheet House with Half Varandah

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble, France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

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LUXEMBOURG

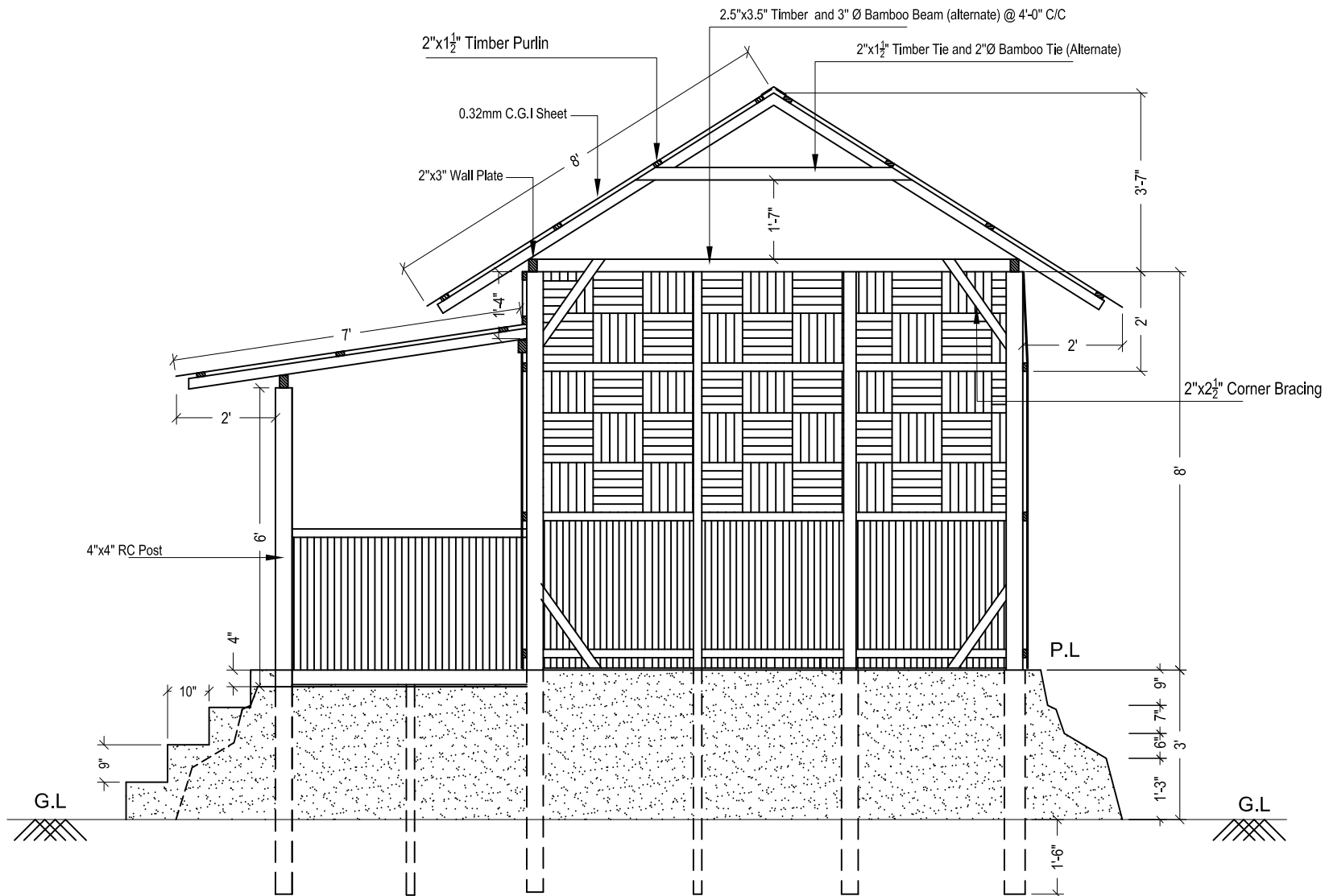
DRAWING TITLE:

PLAN

JULY, 2015

SHEET NO:

S - 01



SECTION: A - A

wall plate-2"x3"

Rafter- 2"x 2.5"

Purlin- 2"x 1"

Betton-2"x 1"

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: KALMAKANDA, MYMENSINGH

TYPE - DP-2 :  
C.G.I. Sheet House with Half Varandah

CONSULTANTS



DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESH



ENSAG-CRATERRE  
Grenoble , France

DESIGN BY:

BUET

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2. Prof. Dr. Mohammad Shariful Islam

CRATERRE

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

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FUNDING AGENCIES



CARITAS  
BANGLADESH



CARITAS FRANCE



CARITAS  
LUXEMBOURG

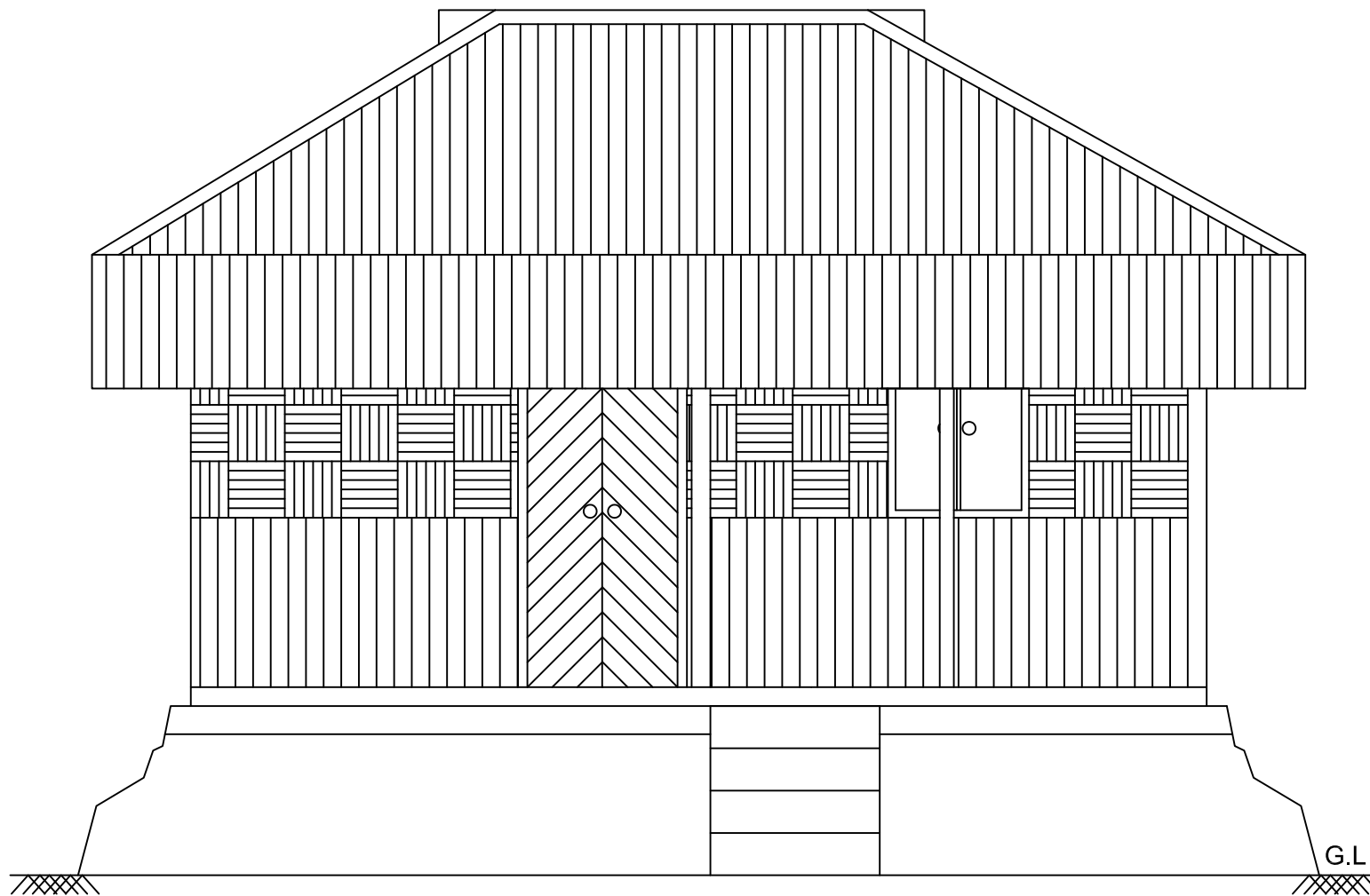
DRAWING TITLE:

SECTION-A A

JULY, 2015

SHEET NO:

S - 02



FRONT ELEVATION

**PROJECT NAME :****CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)**

LOCATION: KALMAKANDA, MYMENSINGH

TYPE - DP-2 :  
C.G.I. Sheet House with Half Varandah**CONSULTANTS**DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France**DESIGN BY:****BUET**

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

**CRAterre**

3. Engr. Olivier Moles

**Caritas, Bangladesh**

1. Mr. Ratan Kumar Podder

**DRAWN BY:**

MD. ABU SAYED RASHED

**CLIENT****FUNDING AGENCIES**CARITAS  
BANGLADESH

CARITAS FRANCE

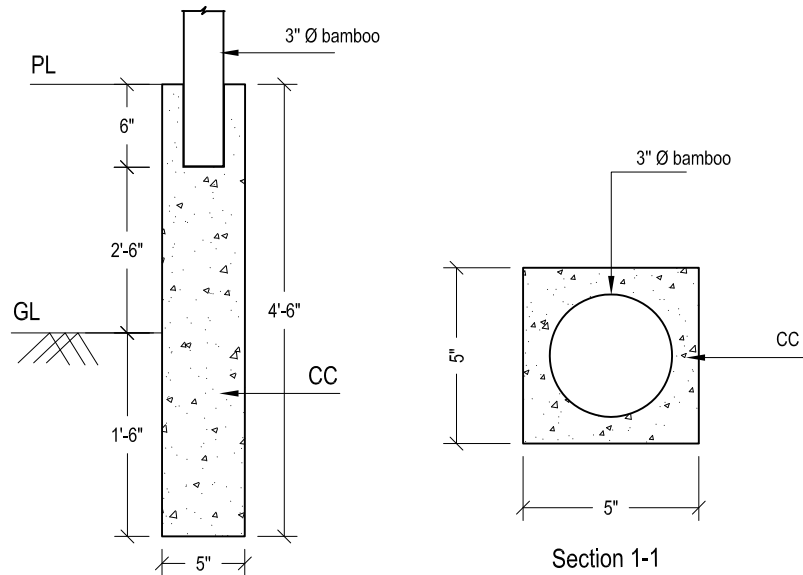
CARITAS  
LUXEMBOURG**DRAWING TITLE:**

FRONT ELEVATION

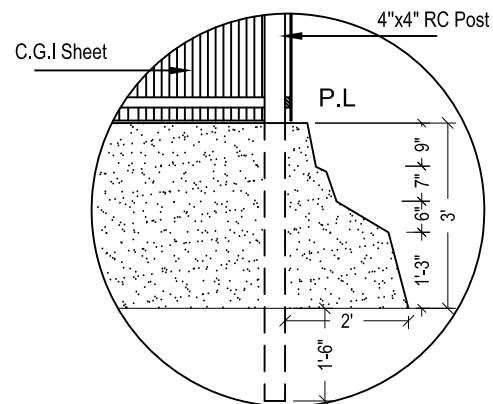
JULY, 2015

**SHEET NO:**

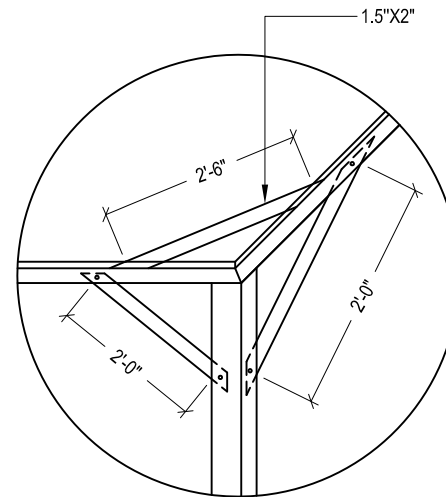
S - 03



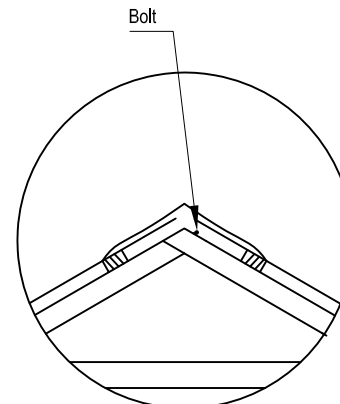
Detail 01: Bamboo into C C Katla



Detail 02: Plinth



Detail 03: Corner Bracing



Detail 04: Roof

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: KALMAKANDA, MYMENSINGH

TYPE - DP-2 :  
C.G.I. Sheet House with Half Varandah

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRATERRE  
Grenoble , France

DESIGN BY:

BUET

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CRATERRE

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Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

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BANGLADESH

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CARITAS  
LUXEMBOURG

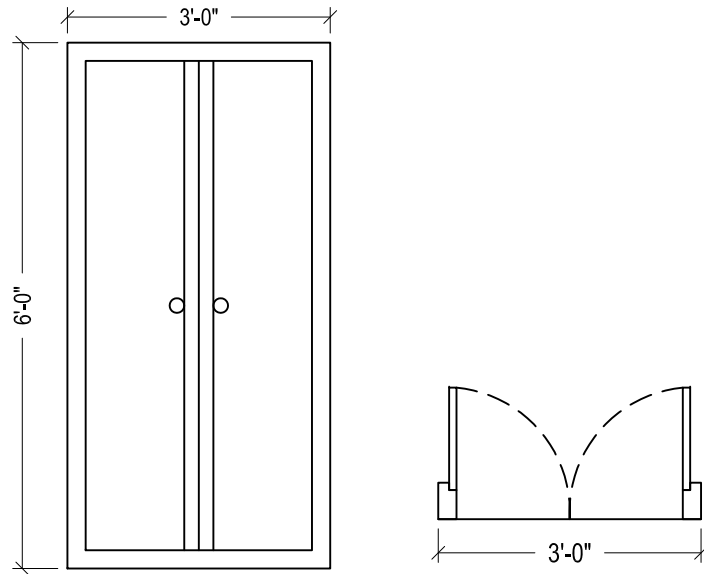
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DETAIL DRAWING

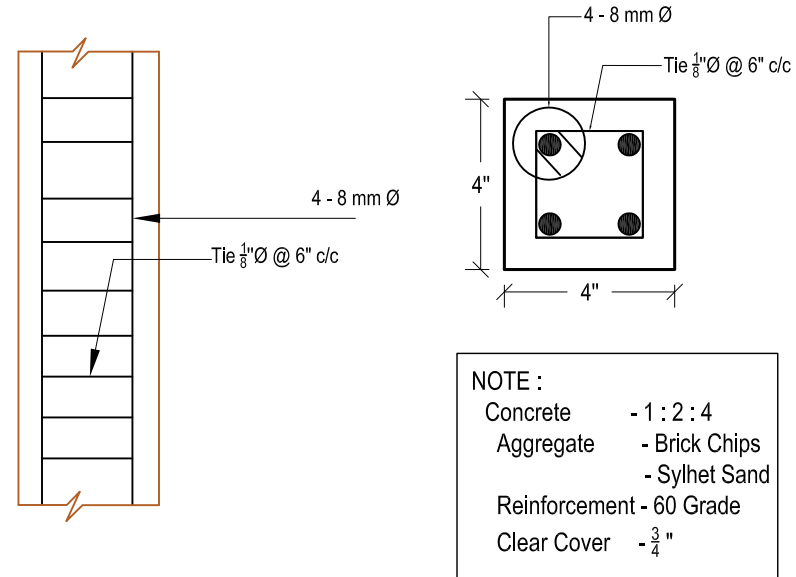
JULY, 2015

SHEET NO:

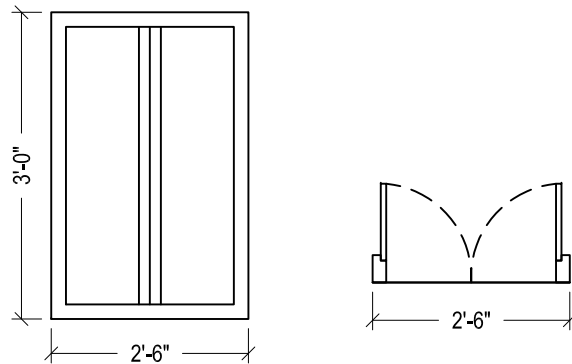
S - 04



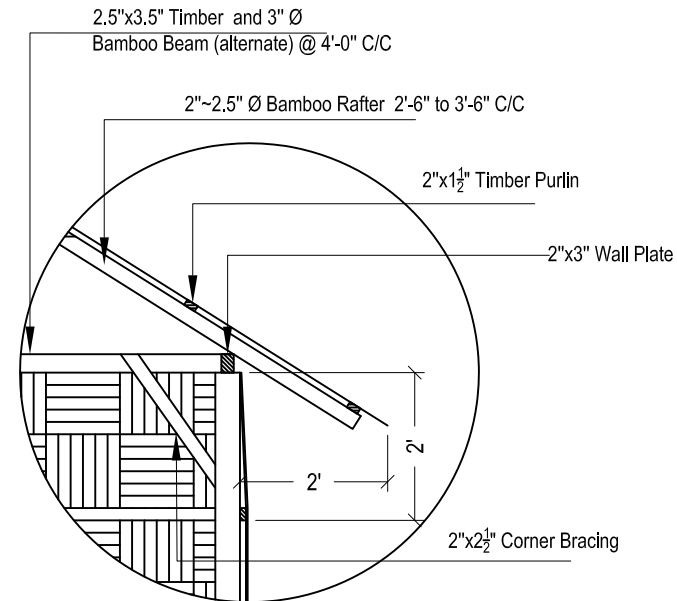
Detail 05: Door



Detail 07: RC Post (Long Section &amp; Cross Section)



Detail 06: Window



Detail 08: Corner Bracing and Roof Arrangement

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: KALMAKANDA, MYMENSINGH

TYPE - DP-2 :  
C.G.I. Sheet House with Half Varandah

CONSULTANTS



DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESH



ENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain  
2. Prof. Dr. Mohammad Shariful Islam

CRAAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

CARITAS  
BANGLADESH

FUNDING AGENCIES



CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

DETAIL DRAWING

JULY, 2015

SHEET NO:

S - 05

MEMBER SCHEDULE				
SL.	ITEMS NAME	DIMENSIONS	MATERIALS NAME	REMARKS
1.	Roof Cover	0.32 mm	CGI Sheet	
2.	Purlin	2"x1.5"	Timber	@ 2'-6" C/C
3.	Rafter	2" to 2.5" dia	Bamboo	@ 2'-6" TO 3'-6" C/C
4.	Center Rafter	2"x2.5"	Timber	
5.	Tie	2"x1.5" Timber & 2" dia bamboo	Timber & Bamboo	@ 3'-0" to 4'-0" C/C (Alternate)
6.	Roof Beam	2.5"x3.5" Timber & 3" dia bamboo	Timber & Bamboo	@ 4'-0" C/C (Alternate)
7.	Wall Plate	2"x3"	Timber	
8.	Corner Bracing	2"x2.5"	Timber	Both top and bottom
9.	Fence (Top)		Bamboo Mat	
10.	Fence (Bottom)	0.25 mm	CGI Sheet	3' height
11.	Interior Post	3" dia	Bamboo	With <i>Katla</i>
12.	Corner Post	4"x4"x11'-0"	R C	4-8 mm Ø 1:2:4 Concrete
13.	Fance Supporting Post	2" dia	Bamboo	Without <i>Katla</i>
14.	Door	3'-0"x6'-0"	Timber	Position may be changed
15.	Window	2'-6"x3"-0"	Timber	Position may be changed

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: KALMAKANDA, MYMENSINGH

TYPE - DP-2 :  
C.G.I. Sheet House with Half Varandah

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain  
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

CARITAS  
BANGLADESH

FUNDING AGENCIES



CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

MEMBER SCHEDULE

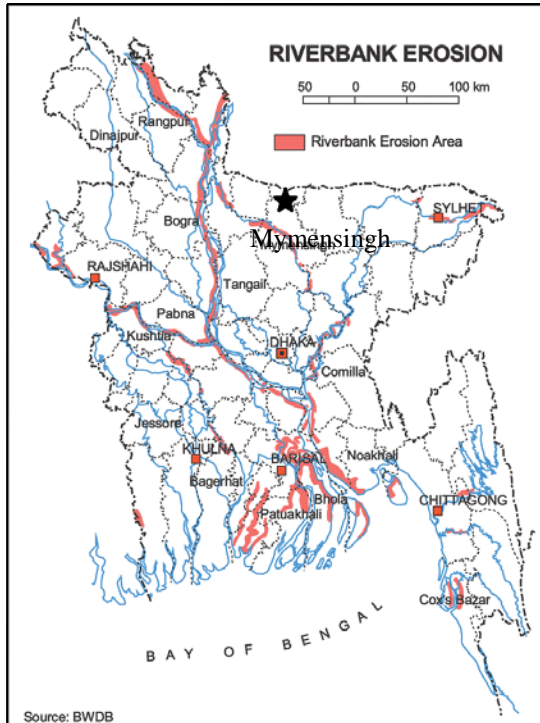
JULY, 2015

SHEET NO:

S - 06

## DIVISION: DHAKA

### 30. DESIGN OF LCH IN DURGAPUR: TYPE – DP 3



#### General Information:

##### Location:

District: Netrokona  
Upazila: Durgapur  
Union: Birisiri  
Mouza/ Village: Baroipara

##### Climatic Feature:

Avg. Maximum Temperature: 33.3 °C  
Avg. Minimum temperature: 12°C  
Annual Rainfall: 2174 mm  
Average Relative Humidity: 80%

##### Geotechnical Feature:

Topography: Plain land near river bank  
MSL: 17 m  
Soil Characteristics: Silt

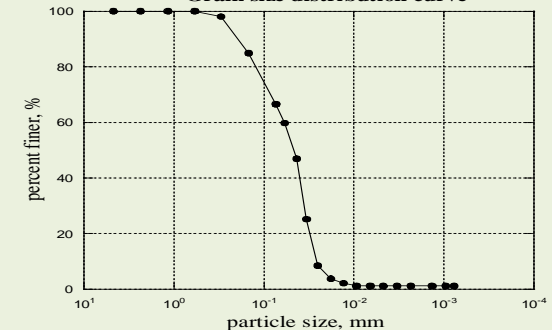
##### Disaster:

Flash flood, River bank erosion, Northwester



#### Completed House

##### Grain size distribution curve



#### Design Considerations:

Available Building Materials: Mud, Bamboo, RC post, CGI sheets, Straw, Wood etc

Foundation: Bamboo posts/ *katla* embedded in soil (1-2 ft)

Plinth: Mud (two/three steps)

Post: RC and bamboo posts with *katla*/without *katla*

Fence/Wall: CGI sheet and bamboo mat (2 parts)

Openings: 1 main door

Ceiling: Ceiling is considered to protect heat and cold

Treatment (bamboo & wood): Water treatment & partial chemical treatment

Roof Type: Four pitched & veranda  
roof is disconnected from main roof

Roof cover: CGI sheets

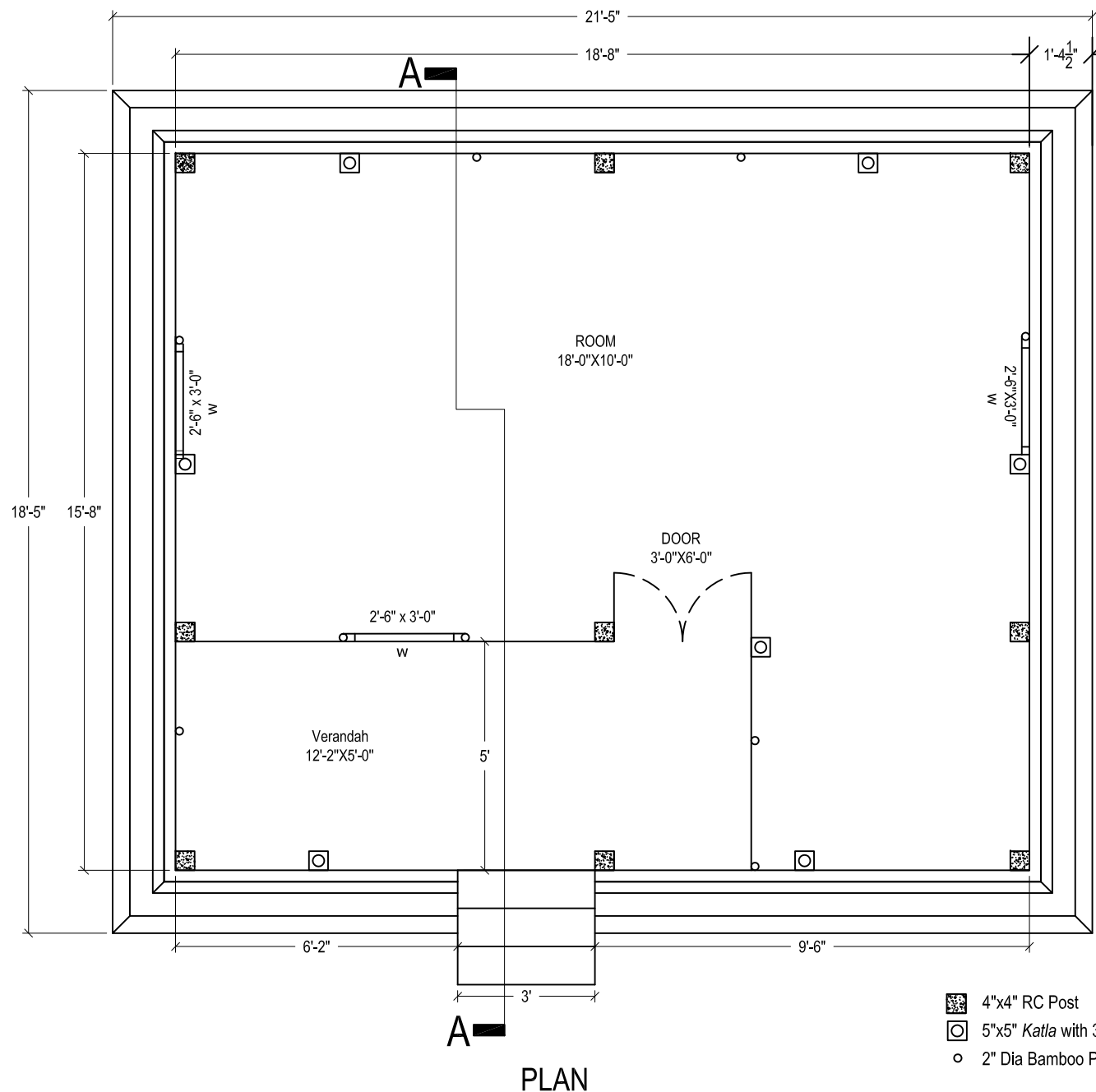
Roof structure: Wooden/ bamboo truss

Bracing: Corner bracing

Joints: Nails, notches, GI wire

Cost: Tk. 85,000





PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: DURGAPUR, MYMENSINGH

TYPE - DP-3 :  
C.G.I. Sheet House with Half Verandah

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAtterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain  
2. Prof. Dr. Mohammad Shariful Islam

CRAtterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

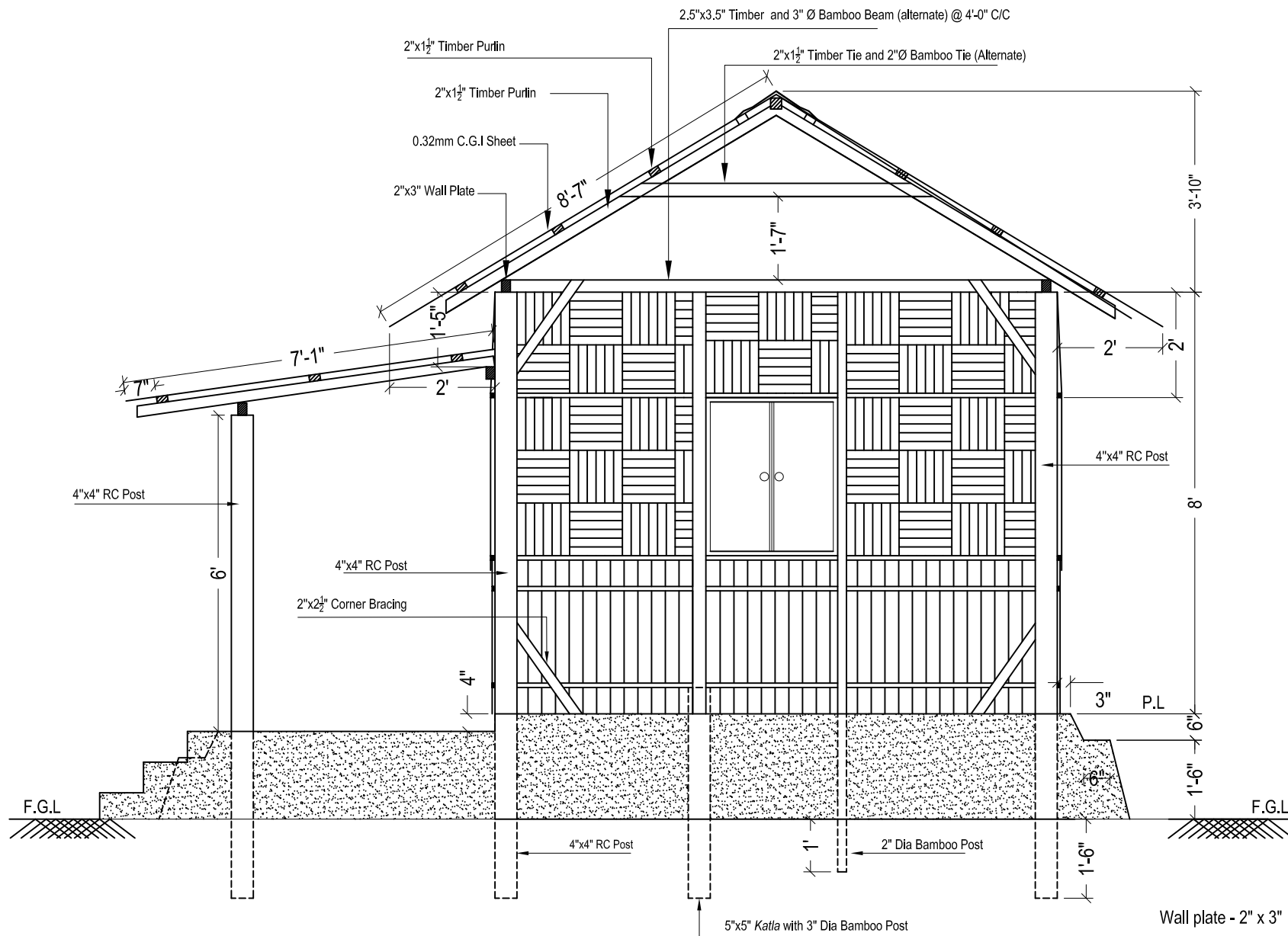
DRAWING TITLE:

PLAN

JULY, 2015

SHEET NO:

S - 01



SECTION : A - A

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: DURGAPUR, MYMENSINGH

TYPE - DP-3 :  
C.G.I. Sheet House with Half Varandah

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRATERRE  
Grenoble, France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRATERRE

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

CARITAS  
BANGLADESH

FUNDING AGENCIES

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CARITAS FRANCECARITAS  
LUXEMBOURG

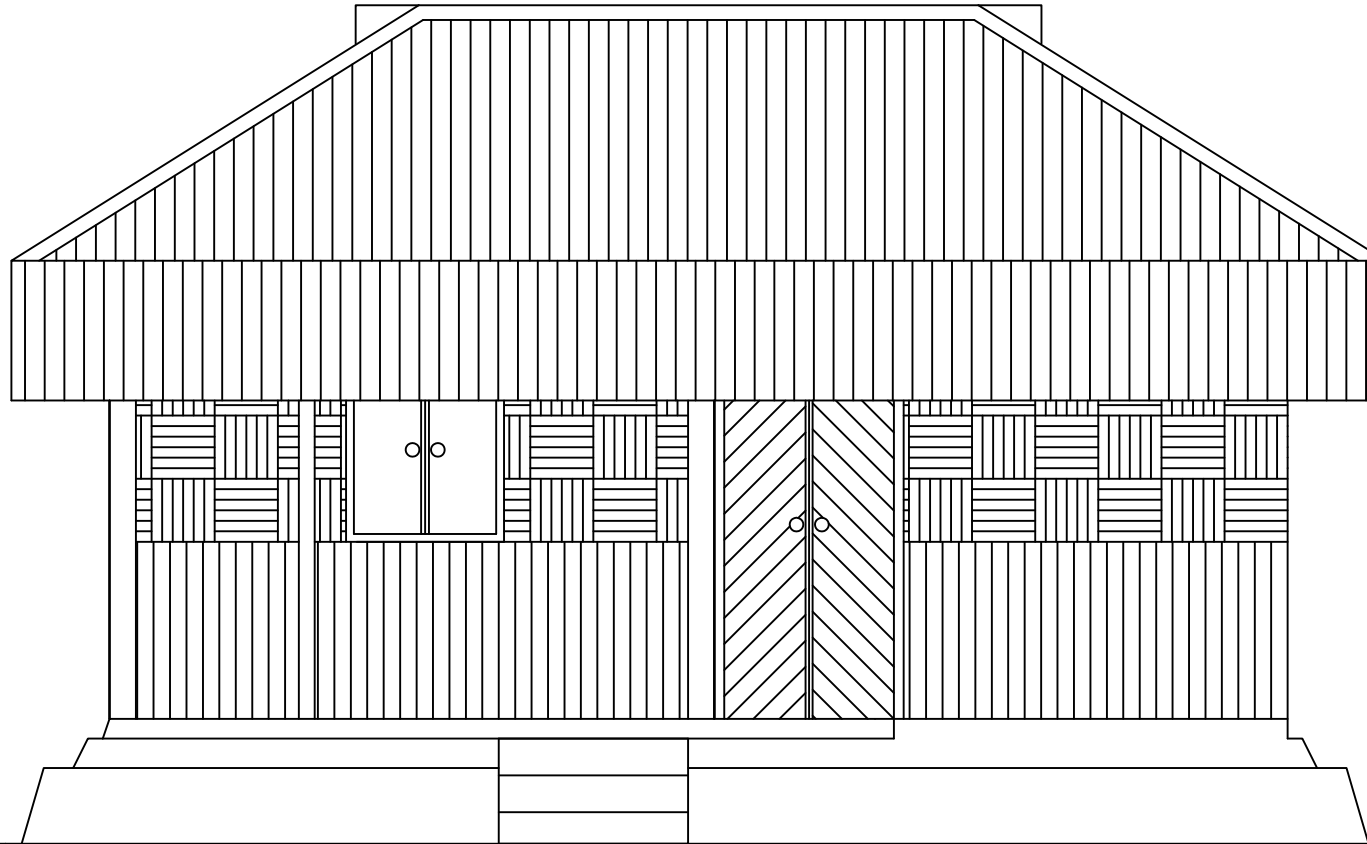
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SECTION: A-A

JULY, 2015

SHEET NO:

S - 02



FRONT ELEVATION

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: DURGAPUR, MYMENSINGH

TYPE - DP-3 :  
C.G.I. Sheet House with Half Varandah

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

CARITAS  
BANGLADESH

FUNDING AGENCIES



CARITAS FRANCE

CARITAS  
LUXEMBOURG

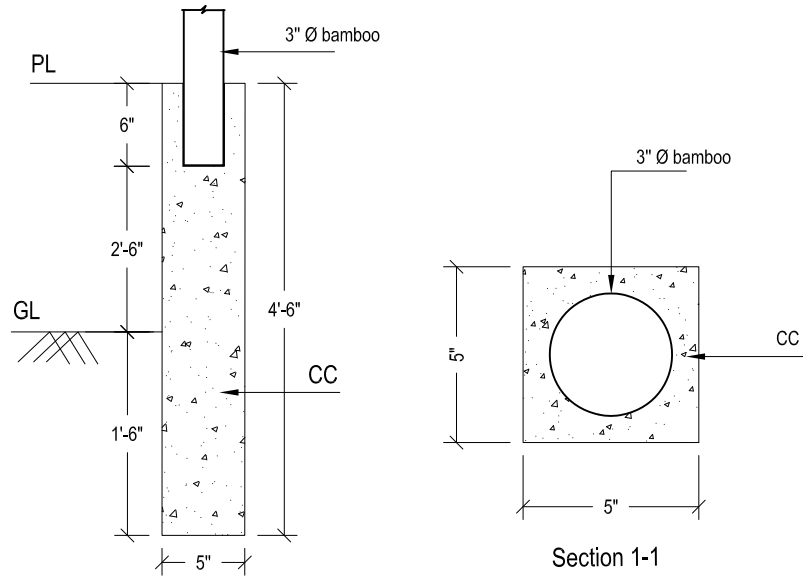
DRAWING TITLE:

FRONT ELEVATION

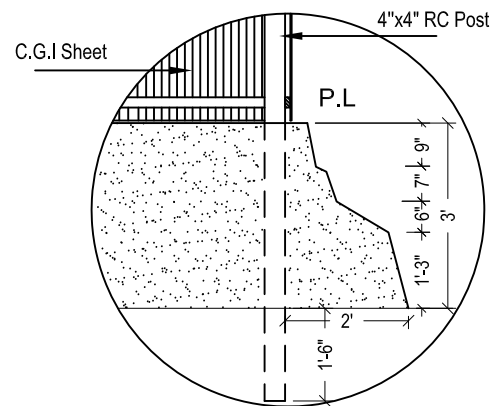
JULY, 2015

SHEET NO:

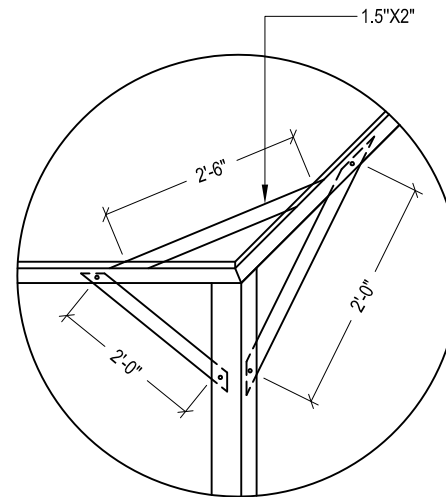
S - 03



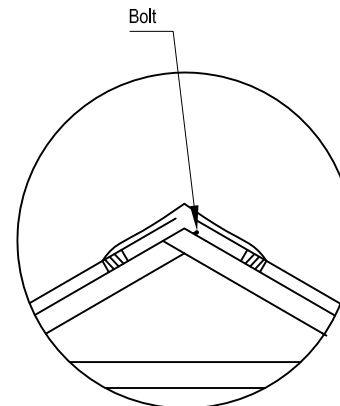
Detail 01: Bamboo into C C Katla



Detail 02: Plinth



Detail 03: Corner Bracing



Detail 04: Roof

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: DURGAPUR, MYMENSINGH

TYPE - DP-3 :  
C.G.I. Sheet House with Half Varandah

CONSULTANTS



DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESH



ENSAG-CRAtterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain  
2. Prof. Dr. Mohammad Shariful Islam

CRAtterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT



CARITAS  
BANGLADESH

FUNDING AGENCIES



CARITAS FRANCE



CARITAS  
LUXEMBOURG

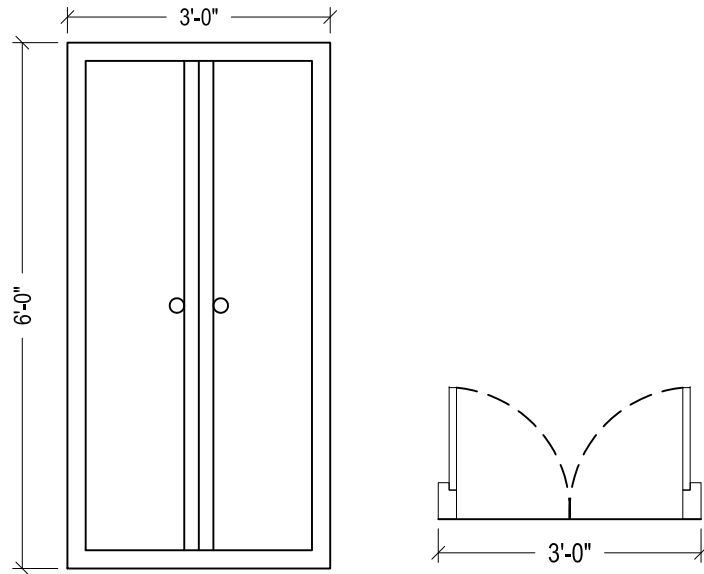
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DETAIL DRAWING

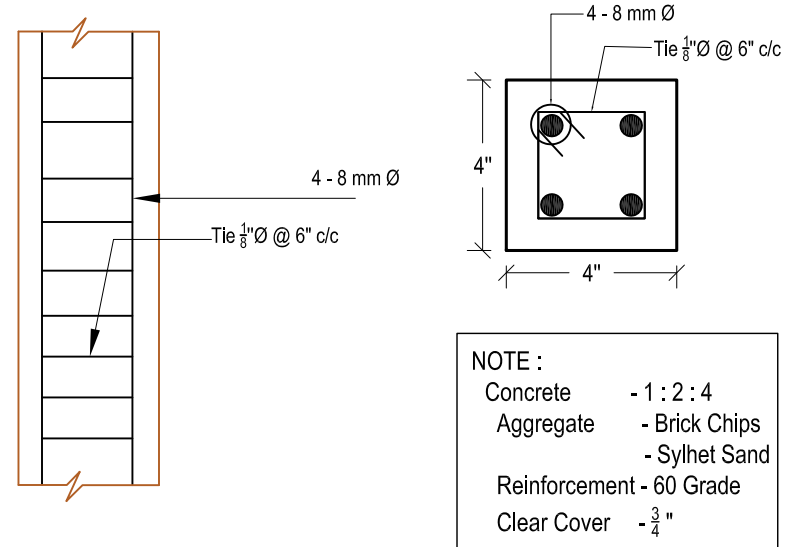
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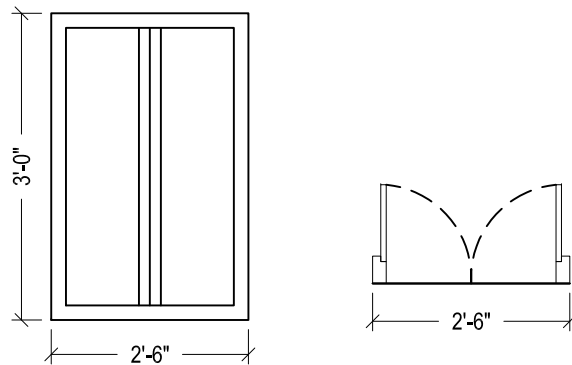
S - 04



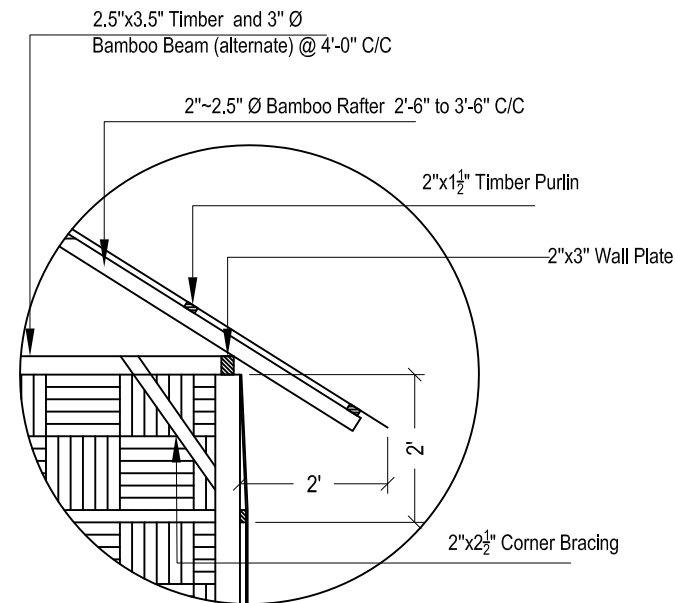
Detail 05: door



Detail 07: RC Post (Long Section &amp; Cross Section)



Detail 06: Window



Detail 08: Corner Bracing and Roof Arrangement

## PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: DURGAPUR, MYMENSINGH

TYPE - DP-3 :  
C.G.I. Sheet House with Half Varandah

## CONSULTANTS



DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESH



ENSAG-CRAterre  
Grenoble , France

## DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain  
2. Prof. Dr. Mohammad Shariful Islam

CRAAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

## DRAWN BY:

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## CLIENT

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BANGLADESH

## FUNDING AGENCIES



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LUXEMBOURG

## DRAWING TITLE:

DETAIL DRAWING

JULY, 2015

SHEET NO:

S - 05

MEMBER SCHEDULE				
SL.	ITEMS NAME	DIMENSIONS	MATERIALS NAME	REMARKS
1.	Roof Cover	0.32 mm	CGI Sheet	
2.	Purlin	2"x1.5"	Timber	@ 2'-6" C/C
3.	Rafter	2" to 2.5" dia	Bamboo	@ 2'-6" TO 3'-6" C/C
4.	Center Rafter	2"x2.5"	Timber	
5.	Tie	2"x1.5" Timber & 2" dia bamboo	Timber & Bamboo	@ 3'-0" to 4'-0" C/C (Alternate)
6.	Roof Beam	2.5"x3.5" Timber & 3" dia bamboo	Timber & Bamboo	@ 4'-0" C/C (Alternate)
7.	Wall Plate	2"x3"	Timber	
8.	Corner Bracing	2"x2.5"	Timber	Both top and bottom
9.	Fence (Top)		Bamboo Mat	
10.	Fence (Bottom)	0.25 mm	CGI Sheet	3' height
11.	Interior Post	3" dia	Bamboo	With <i>Katla</i>
12.	Corner Post	4"x4"x11'-0"	R C	4-8 mm Ø 1:2:4 Concrete
13.	Fance Supporting Post	2" dia	Bamboo	Without <i>Katla</i>
14.	Door	3'-0"x6'-0"	Timber	Position may be changed
15.	Window	2'-6"x3"-0"	Timber	Position may be changed

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: DURGAPUR, MYMENSINGH

TYPE - DP-3 :  
C.G.I. Sheet House with Half Varandah

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain  
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

CARITAS  
BANGLADESH

FUNDING AGENCIES



CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

MEMBER SCHEDULE

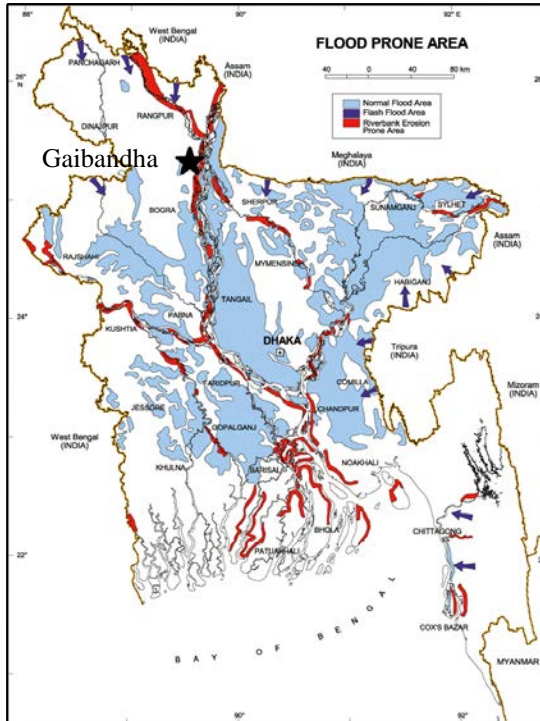
JULY, 2015

SHEET NO:

S - 06

## DIVISION: RANGPUR

### 31. DESIGN OF LCH IN GAIBANDHA: TYPE – 1



#### SITE TOPOGRAPHY



#### General Information:

##### Location:

District: Gaibandha  
Upazila: Gaibandha Sadar  
Union: Gidari  
Mouza/ Village: South Gidari

##### Climatic Feature:

Avg. Maximum Temperature: 33.5 °C  
Avg. Minimum temperature: 10.5°C  
Annual Rainfall: 2536 mm  
Average Relative Humidity: 77%

##### Geotechnical Feature:

Topography: Flat land near river bank, char land  
MSL: 21 m  
Soil Characteristics: Coarse sand

##### Disaster:

Flood, river bank erosion, northwester/tornado



Completed House

#### Design Considerations:

Available Building Materials: Mud, Bamboo, Jute ropes, jute stick, *batha* plant, RC post, CGI sheets, Straw, Wood etc.

Foundation: Wooden/ Bamboo posts embedded in soil (1-2 ft)

Plinth: Mud (two/three steps)

Post: Bamboo or RC posts

Fence/Wall: CGI sheet and bamboo mat (3 parts)

Openings: 1 main door

Treatment (bamboo & wood): Water treatment & partial chemical treatment Cost: Tk. 90,000

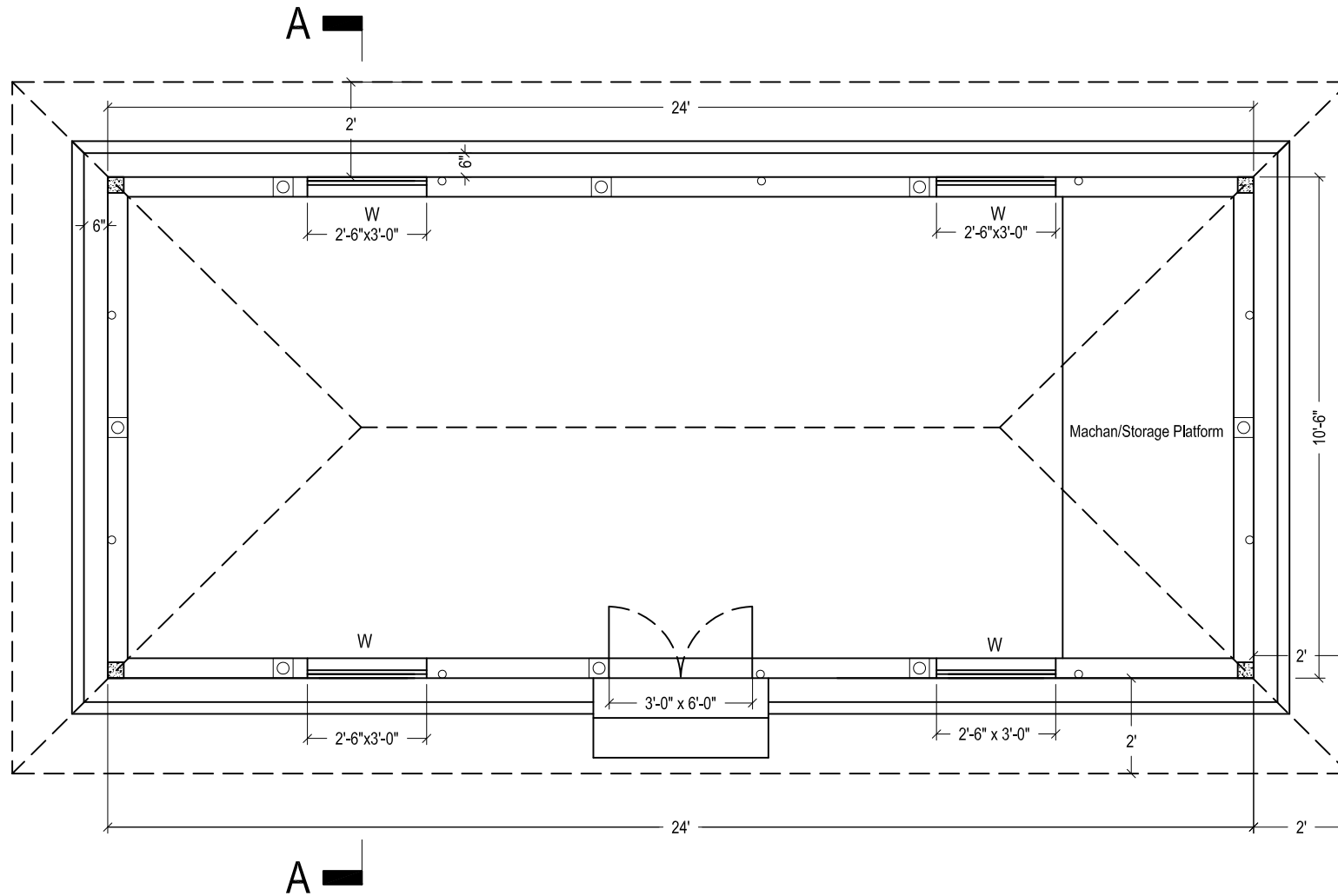
Roof Type: Four pitched

Roof cover: CGI sheets

Roof structure: Wooden/ bamboo truss






Bracing: Corner bracing

Joints: Nails, notches, GI wire,

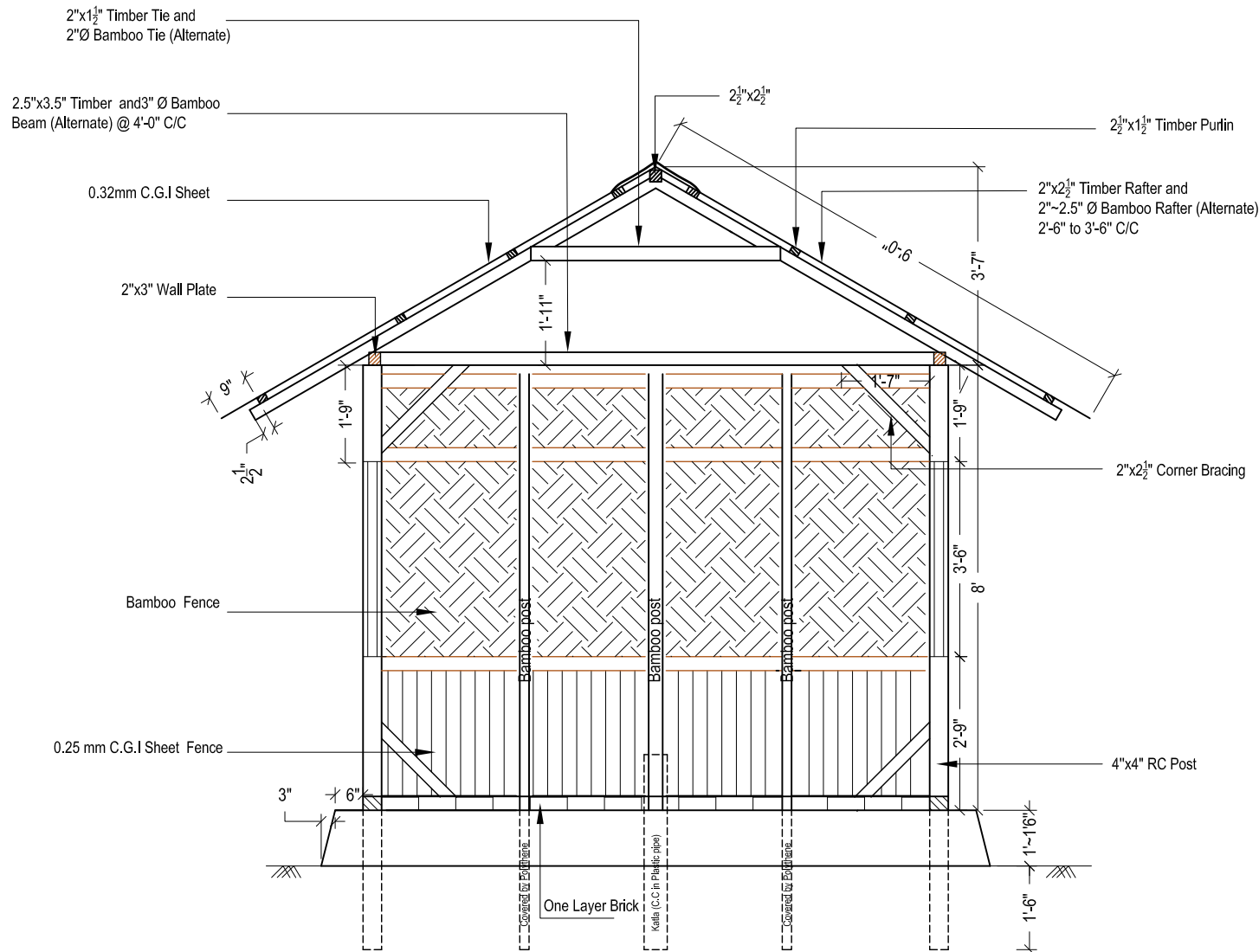


PLAN

- 4"x4" RC post
- 5"x5" Katla with 3" Ø Bamboo post
- 2" Ø Bamboo post

PROJECT NAME :	
CONSTRUCTION OF PILOT LOW COST HOUSES (LCH)	
LOCATION: GIDARI, GAIBANDHA	
TYPE 01 : Double Fence C.G.I. Sheet House	
CONSULTANTS	
 DEPARTMENT OF CIVIL ENGINEERING, BRTC, BUET, DHAKA BANGLADESH	 ENSAG-CRAterre Grenoble , France
DESIGN BY:	
BUET 1. Prof. Dr. Tahsin Reza Hossain 2. Prof. Dr. Mohammad Shariful Islam  CRAterre 3. Engr. Olivier Moles  Caritas, Bangladesh 1. Mr. Ratan Kumar Podder	
DRAWN BY:	
MD. ABU SAYED RASHED	
CLIENT	FUNDING AGENCIES
 CARITAS BANGLADESH	 CARITAS FRANCE   CARITAS LUXEMBOURG
DRAWING TITLE:	
PLAN	
JULY, 2015	SHEET NO: S - 01





PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: GIDARI, GAIBANDHA

TYPE 01 :  
Double Fence C.G.I. Sheet House

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

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2. Prof. Dr. Mohammad Sharif Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

CARITAS  
BANGLADESH

FUNDING AGENCIES



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CARITAS  
LUXEMBOURG

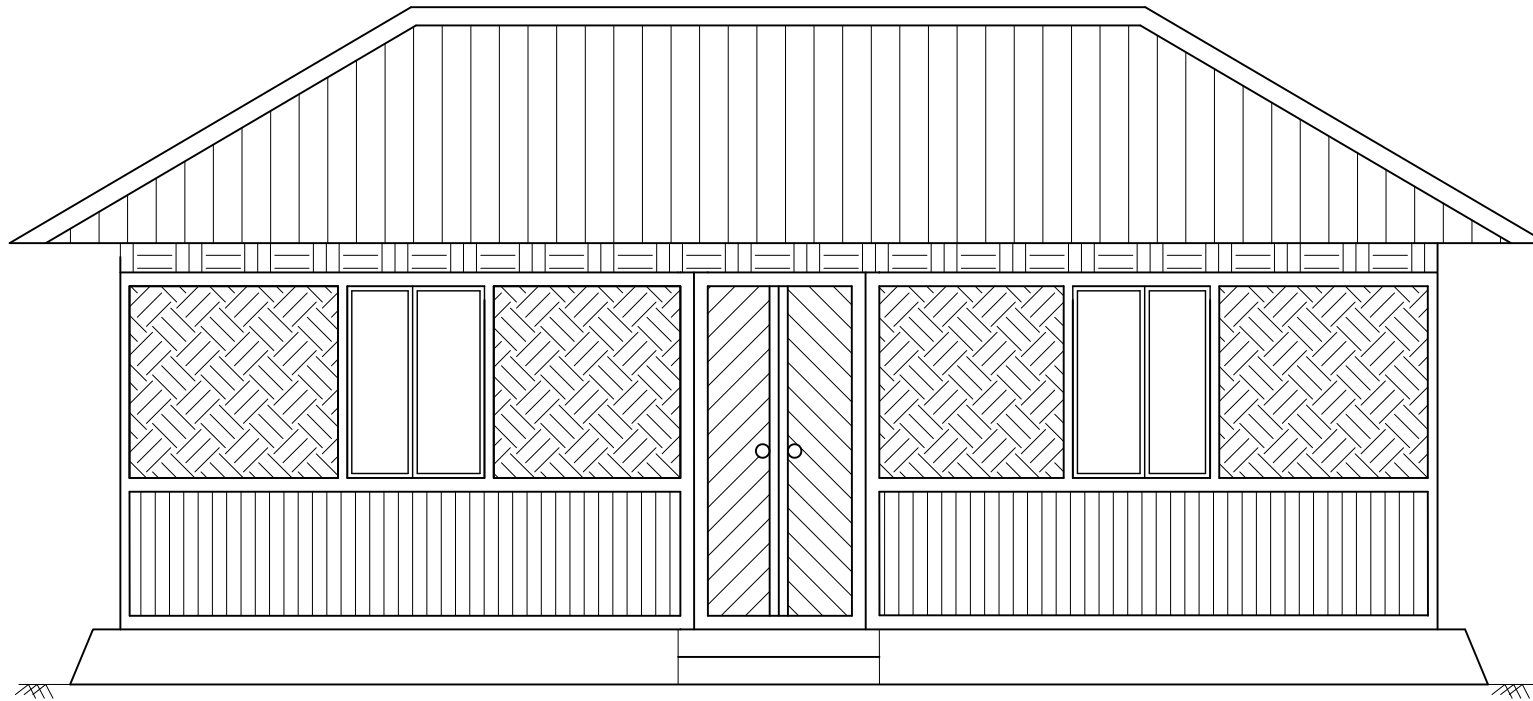
DRAWING TITLE:

SECTION: A-A

JULY, 2015

SHEET NO:

S - 02



FRONT ELEVATION

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: GIDARI, GAIBANDHA

TYPE 01 :  
Double Fence C.G.I. Sheet House

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

CARITAS  
BANGLADESH

FUNDING AGENCIES



CARITAS FRANCE

CARITAS  
LUXEMBOURG

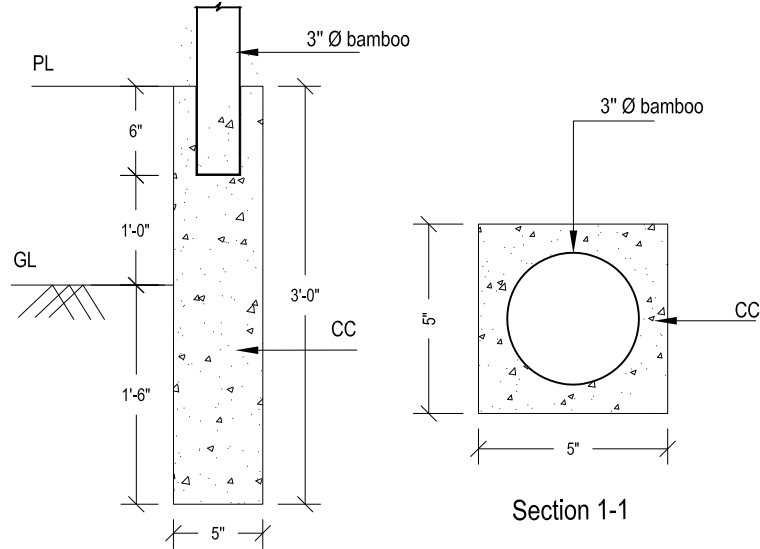
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FRONT ELEVATION

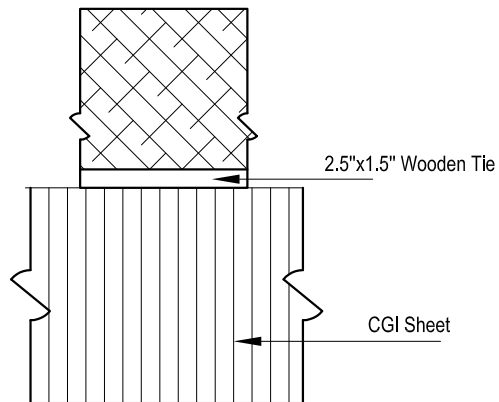
JULY, 2015

SHEET NO:

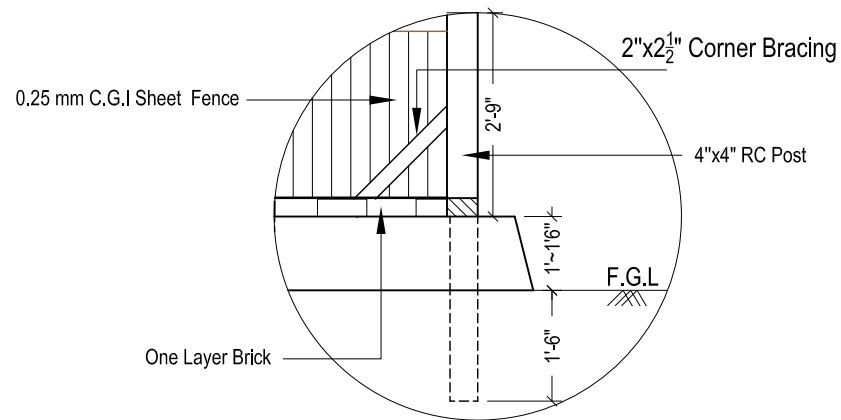
S - 03



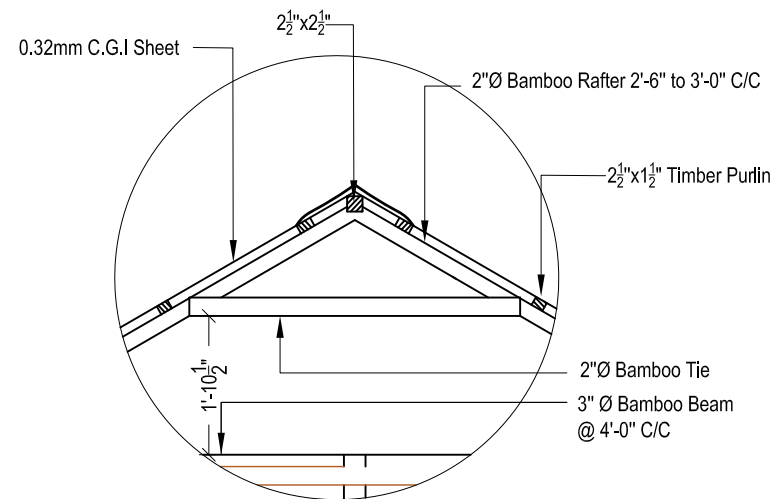
Detail 01: Bamboo into C C Katla








Detail 02: CGI Sheet &amp; Bamboo Fence Joint

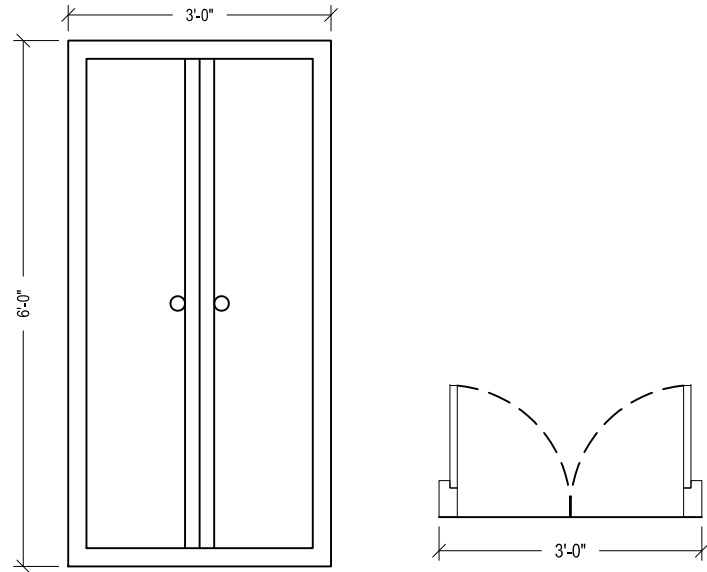


Detail 03: Plinth

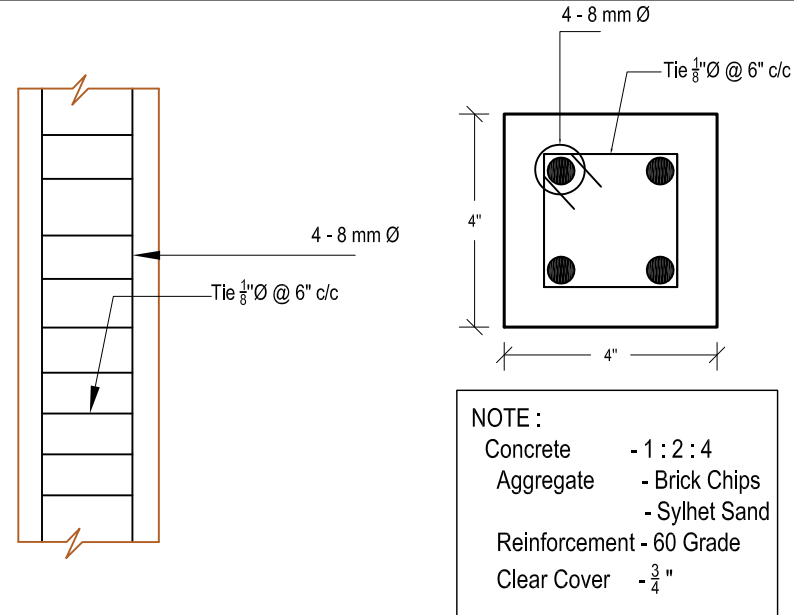


Detail 04: Roof Top

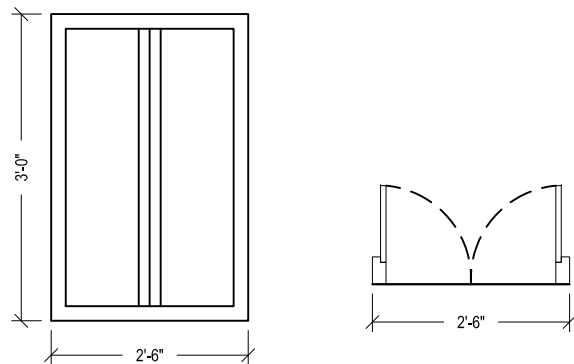
PROJECT NAME :	
CONSTRUCTION OF PILOT LOW COST HOUSES (LCH)	
LOCATION: GIDARI, GAIBANDHA	
TYPE 01 : Double Fence C.G.I. Sheet House	
CONSULTANTS	
 DEPARTMENT OF CIVIL ENGINEERING, BRTC, BUET, DHAKA BANGLADESH	 ENSAG-CRATERre Grenoble , France
DESIGN BY:	
BUET 1. Prof. Dr. Tahsin Reza Hossain 2. Prof. Dr. Mohammad Shariful Islam	
CRATERre 3. Engr. Olivier Moles	
Caritas, Bangladesh 1. Mr. Ratan Kumar Podder	
DRAWN BY:	
MD. ABU SAYED RASHED	
CLIENT	FUNDING AGENCIES
 CARITAS BANGLADESH	 CARITAS FRANCE   CARITAS LUXEMBOURG
DRAWING TITLE:	
DETAILS	
JULY, 2015	SHEET NO: S - 04



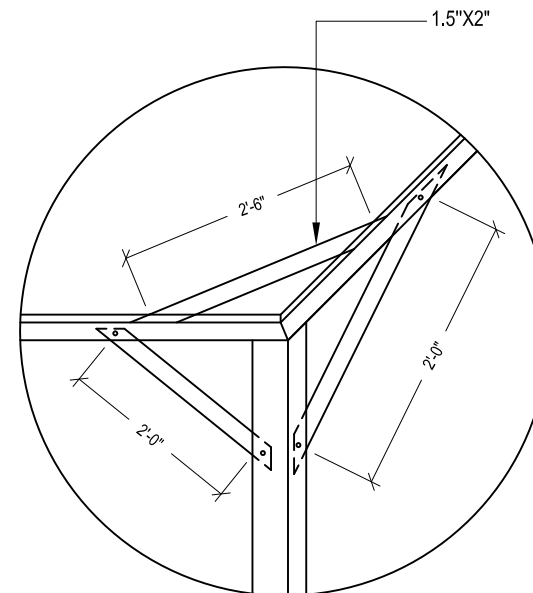
Detail 05: Door








Detail 07: RC Post (Long Section &amp; Cross Section)



Detail 06: Window



Detail 08: Corner Bracing

PROJECT NAME :	
CONSTRUCTION OF PILOT LOW COST HOUSES (LCH)	
LOCATION: GIDARI, GAIBANDHA	
TYPE 01 : Double Fence C.G.I. Sheet House	
CONSULTANTS	
 DEPARTMENT OF CIVIL ENGINEERING, BRTC, BUET, DHAKA BANGLADESH	 ENSAG-CRATERRE Grenoble , France
DESIGN BY:	
BUET 1. Prof. Dr. Tahsin Reza Hossain 2. Prof. Dr. Mohammad Shariful Islam	
CRATERRE 3. Engr. Olivier Moles	
Caritas, Bangladesh 1. Mr. Ratan Kumar Podder	
DRAWN BY:	
MD. ABU SAYED RASHED	
CLIENT	FUNDING AGENCIES
 CARITAS BANGLADESH	 Caritas France Secours Catholique CARITAS FRANCE  CARITAS LUXEMBOURG
DRAWING TITLE:	
DETAILS	
JULY, 2015	SHEET NO: S - 05

MEMBER SCHEDULE				
SL.	ITEMS NAME	DIMENSIONS	MATERIALS NAME	REMARKS
1.	Roof Cover	0.32 mm	CGI Sheet	
2.	Purlin	2"x1.5"	Timber	@ 2'-6" C/C
3.	Rafter	2" to 2.5" dia	Bamboo	@ 2'-6" TO 3'-6" C/C
4.	Center Rafter	2"x2.5"	Timber	
5.	Tie	2"x1.5" Timber & 2" dia bamboo	Timber & Bamboo	@ 3'-0" to 4'-0" C/C (Alternate)
6.	Roof Beam	2.5"x3.5" Timber & 3" dia bamboo	Timber & Bamboo	@ 4'-0" C/C (Alternate)
7.	Wall Plate	2"x3"	Timber	
8.	Corner Bracing	2"x2.5"	Timber	Both top and bottom
9.	Fance (Top)		Bamboo Mat	
10.	Fance (Bottom)	0.25 mm	CGI Sheet	3' height
11.	Interior Post	3" dia	Bamboo	With <i>Katla</i>
12.	Corner Post	4"x4"x11'-0"	R C	4-8 mm Ø 1:2:4 Concrete
13.	Fance Supporting Post	2" dia	Bamboo	Without <i>Katla</i>
14.	Door	3'-0"x6'-0"	Timber	Position may be changed
15.	Window	2'-6"x3'-0"	Timber	Position may be changed

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: GIDARI, GAIBANDHA

TYPE 01 :  
Double Fence C.G.I. Sheet House

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain  
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

MEMBER SCHEDULE

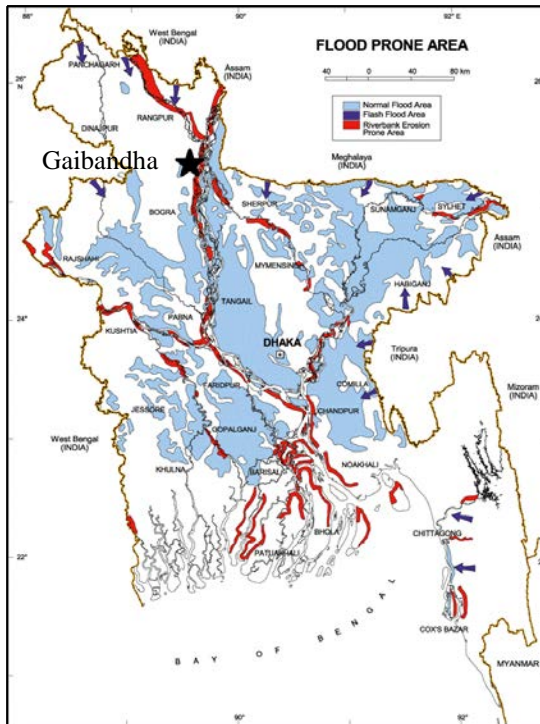
JULY, 2015

SHEET NO:

S - 06

## DIVISION: RANGPUR

### 32. DESIGN OF LCH IN GAIBANDHA: TYPE – 2



#### SITE TOPOGRAPHY



#### General Information:

##### Location:

District: Gaibandha  
Upazila: Gaibandha Sadar  
Union: Gidari  
Mouza/ Village: South Gidari

##### Climatic Feature:

Avg. Maximum Temperature: 33.5 °C  
Avg. Minimum temperature: 10.5°C  
Annual Rainfall: 2536 mm  
Average Relative Humidity: 77%

##### Geotechnical Feature:

Topography: Flat land near river bank, char land  
MSL: 21 m  
Soil Characteristics: Sand

##### Disaster:

Flood, river bank erosion, northwester/tornado



Completed House

#### Design Considerations:

Available Building Materials: Mud, Bamboo, Jute ropes, jute stick, *batha* plant, RC post, CGI sheets, Straw, Wood etc.

Foundation: Wooden/Bamboo posts (*katla*) embedded in soil (1-2 ft)

Plinth: Mud (two/three steps)

Post: Bamboo and RC posts

Fence/Wall: CGI sheet and bamboo mat (3 parts)

Openings: 1 main door + 1 inside door to connect rooms

Treatment (bamboo & wood): Water treatment & partial chemical treatment

Roof Type: Four pitched

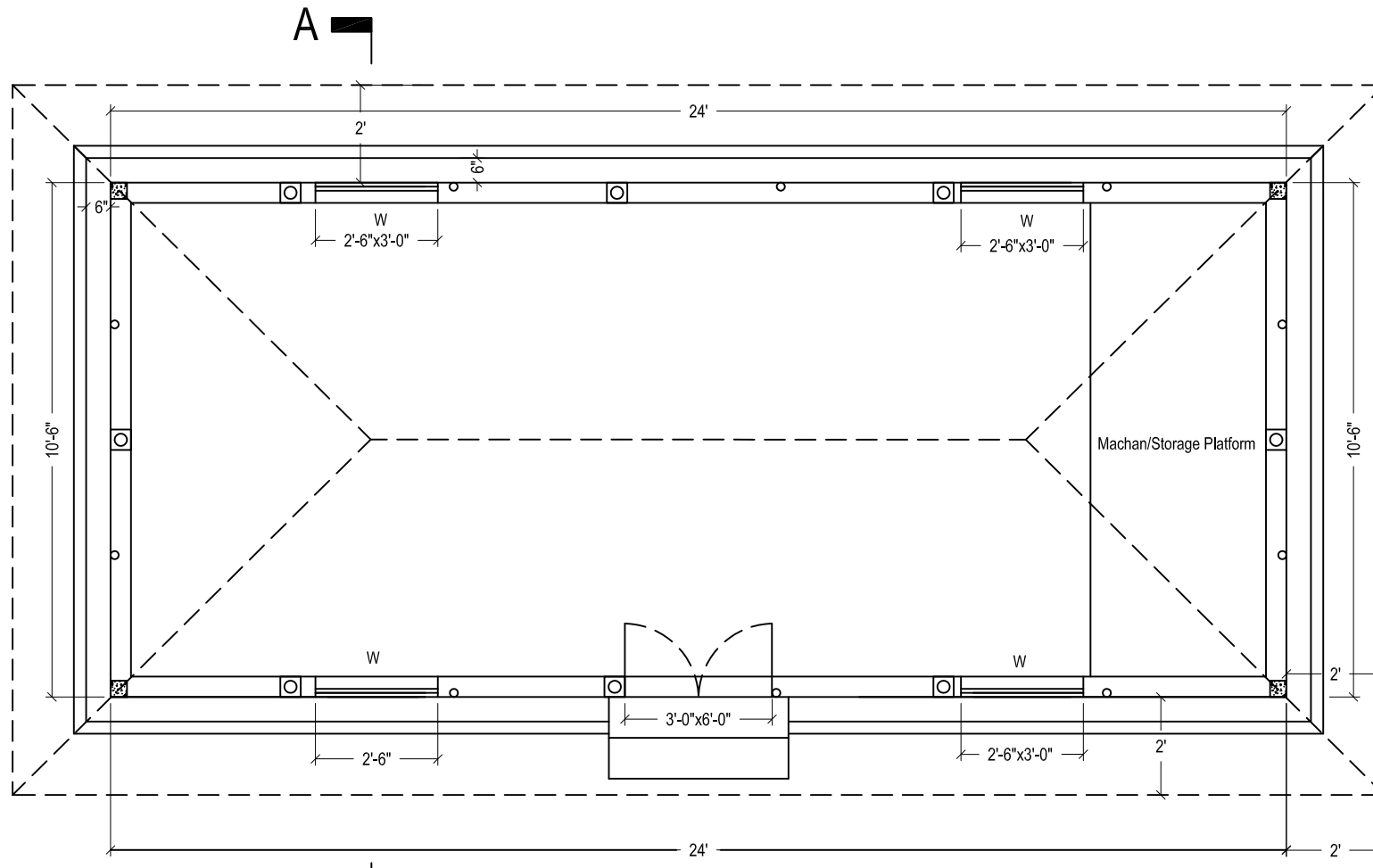
Roof cover: CGI sheets

Roof structure: Wooden/ bamboo truss




Bracing: Corner bracing

Joints: Nails, notches, GI wire,

Cost: Tk. 85,000



PLAN

-  4"x4" RC post
-  5"x5" Katla with 3" Ø Bamboo post
-  2" Ø Bamboo post

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: GIDARI, GAIBANDHA

TYPE: 02

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

CARITAS  
BANGLADESH

FUNDING AGENCIES



CARITAS FRANCE

CARITAS  
LUXEMBOURG

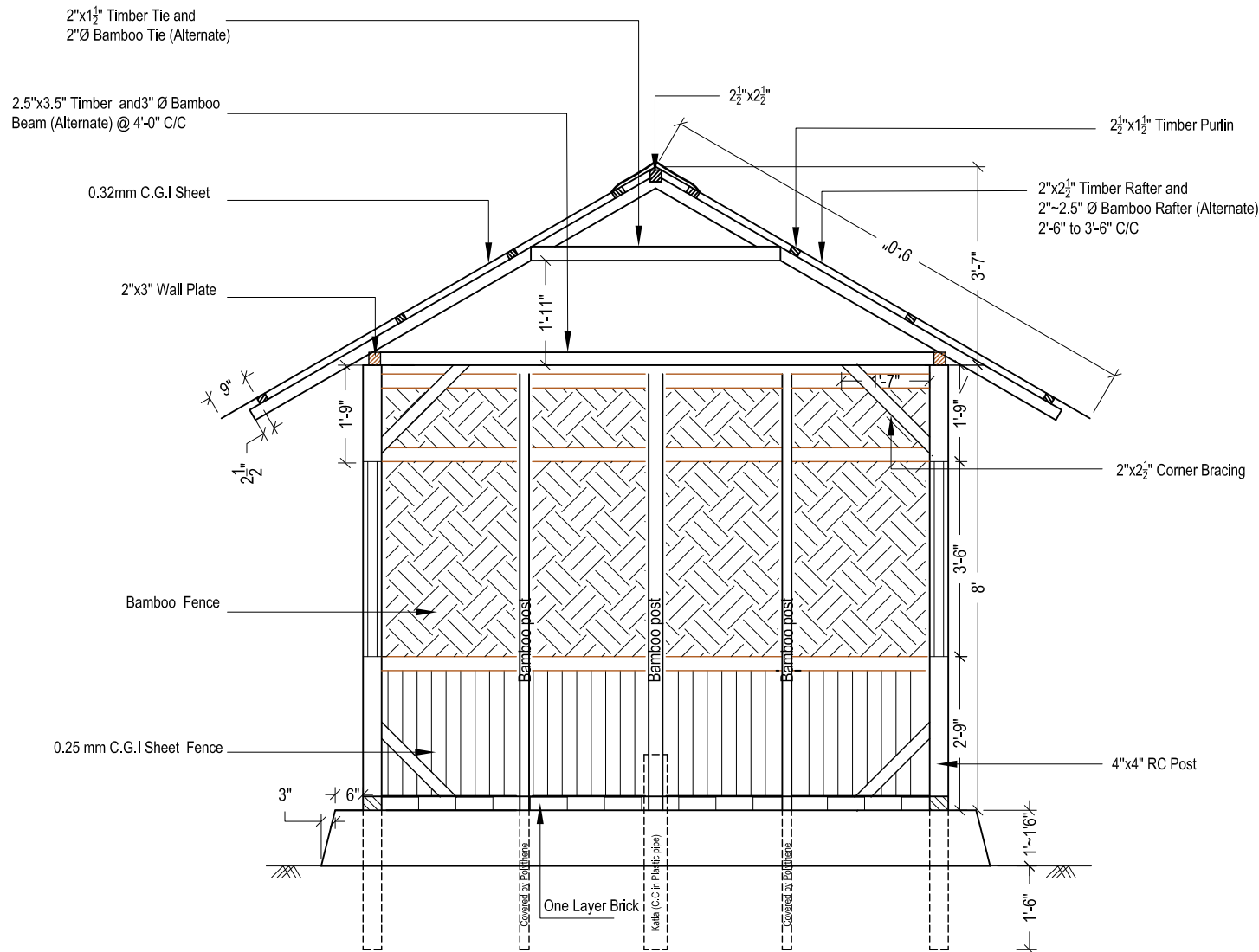
DRAWING TITLE:

PLAN

JULY, 2015

SHEET NO:

S - 01



SECTION : A - A

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: GIDARI, GAIBANDHA

TYPE: 02

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRATERRE  
Grenoble, France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Sharif Islam

CRATERRE

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

CARITAS  
BANGLADESH

FUNDING AGENCIES



CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

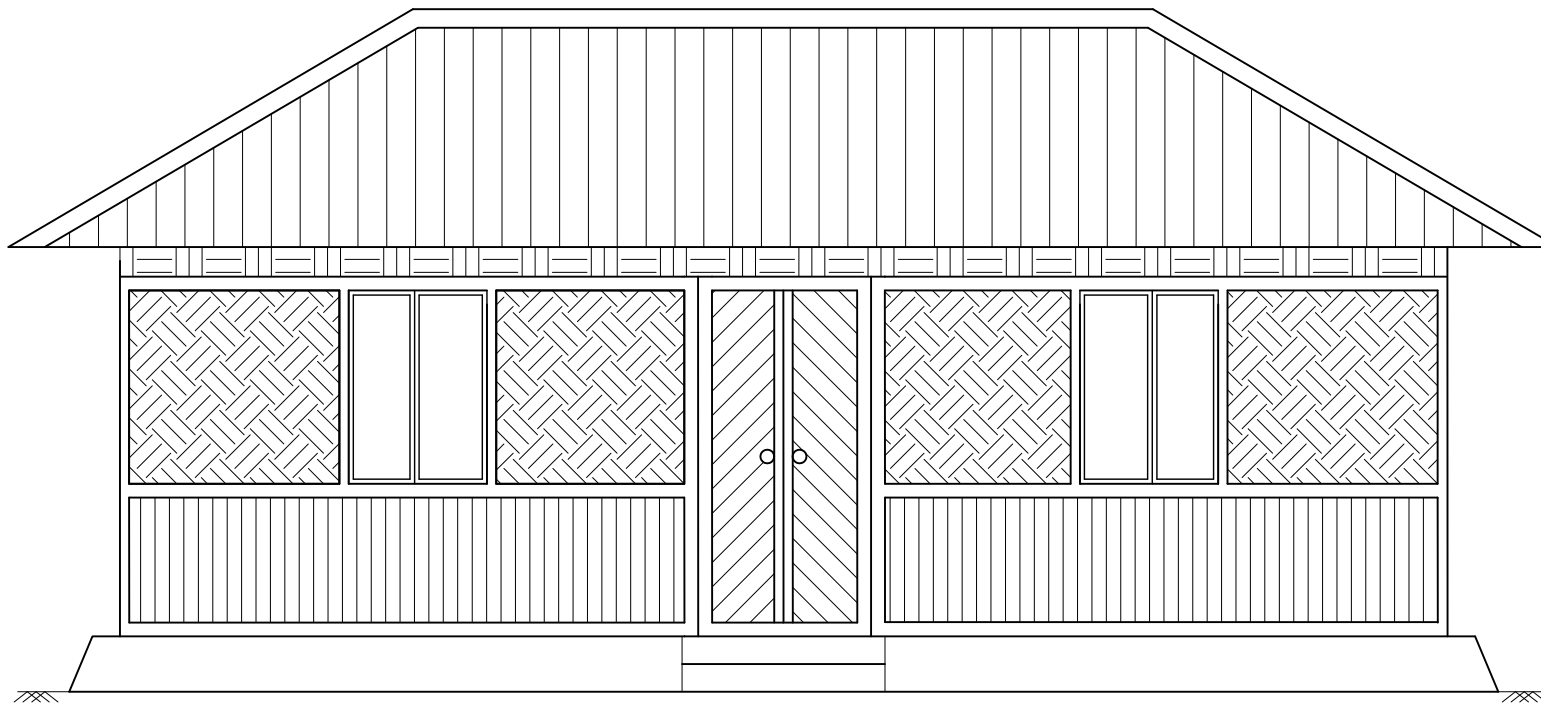
SECTION: A-A

JULY, 2015

SHEET NO:

S - 02





FRONT ELEVATION

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: GIDARI, GAIBANDHA

TYPE: 02

## CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

## DESIGN BY:

## BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

## CRAterre

3. Engr. Olivier Moles

## Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

## DRAWN BY:

MD. ABU SAYED RASHED

## CLIENT

## FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

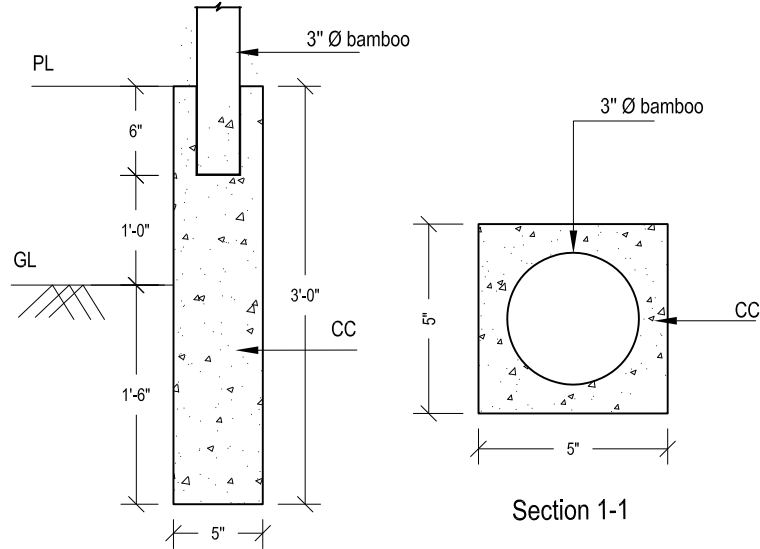
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FRONT ELEVATION

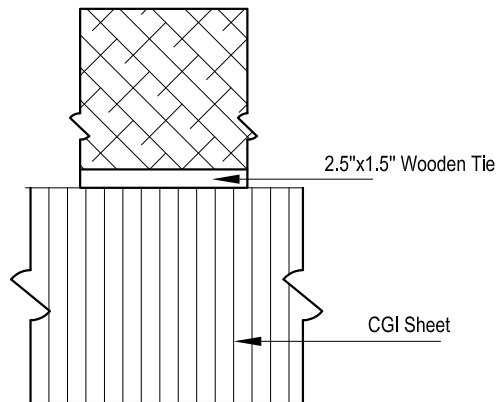
JULY, 2015

SHEET NO:

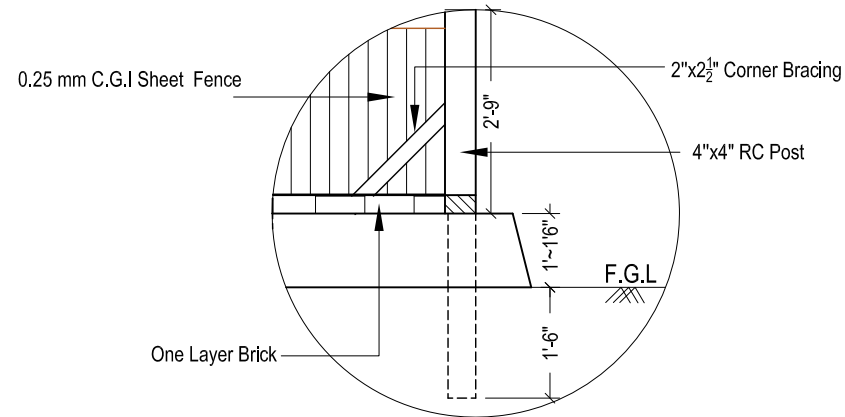
S - 03



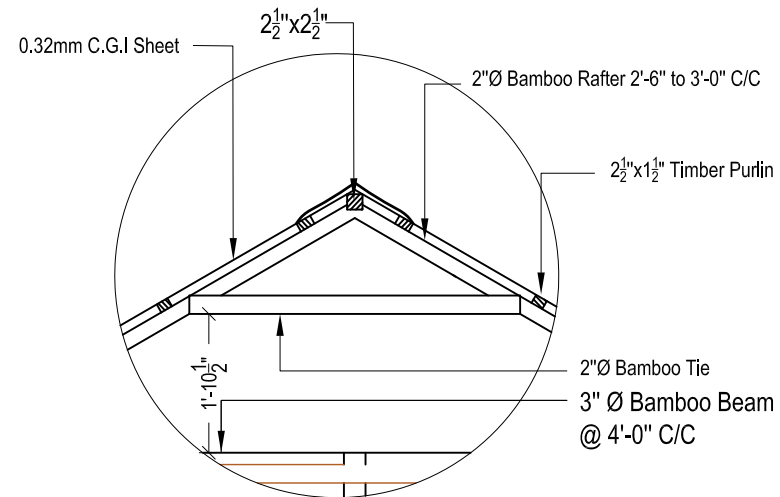
Detail 01: Bamboo into C C Katla



Detail 02: CGI Sheet &amp; Bamboo Fence Joint



Detail 03: Corner Bracing



Detail 04: Roof Top

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: GIDARI, GAIBANDHA

TYPE: 02

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

CARITAS  
BANGLADESH

FUNDING AGENCIES



CARITAS FRANCE

CARITAS  
LUXEMBOURG

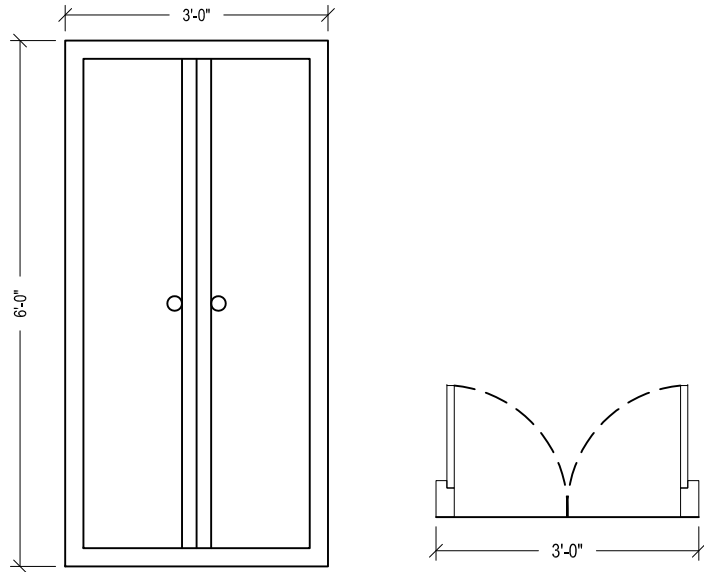
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DETAILS

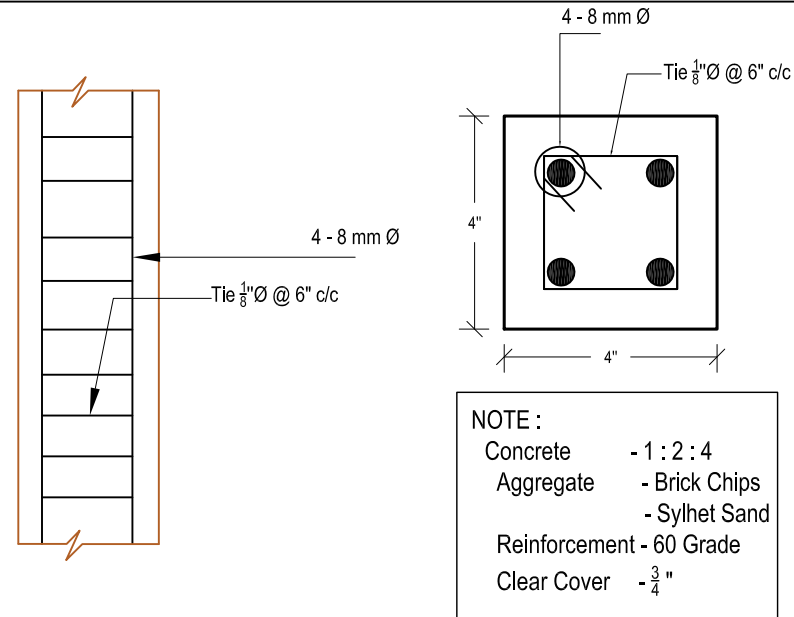
JULY, 2015

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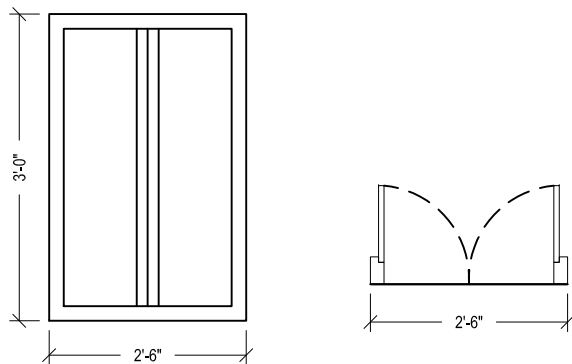
S - 04



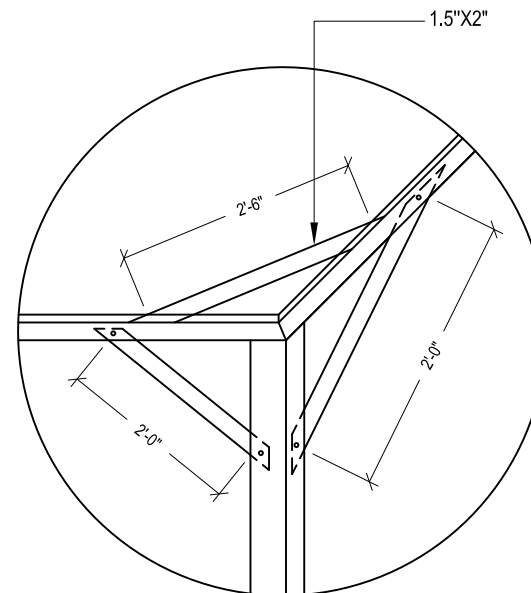
Detail 05: door



Detail 07: RC Post (Long Section &amp; Cross Section)



Detail 06: Window



Detail 03: Corner Bracing

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: GIDARI, GAIBANDHA

TYPE: 02

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain  
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

CARITAS  
BANGLADESH

FUNDING AGENCIES



CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

DETAILS

JULY, 2015

SHEET NO:

S - 05

MEMBER SCHEDULE				
SL.	ITEMS NAME	DIMENSIONS	MATERIALS NAME	REMARKS
1.	Roof Cover	0.32 mm	CGI Sheet	
2.	Purlin	2"x1.5"	Timber	@ 2'-6" C/C
3.	Rafter	2" to 2.5" dia	Bamboo	@ 2'-6" TO 3'-6" C/C
4.	Center Rafter	2"x2.5"	Timber	
5.	Tie	2"x1.5" Timber & 2" dia bamboo	Timber & Bamboo	@ 3'-0" to 4'-0" C/C (Alternate)
6.	Roof Beam	2.5"x3.5" Timber & 3" dia bamboo	Timber & Bamboo	@ 4'-0" C/C (Alternate)
7.	Wall Plate	2"x3"	Timber	
8.	Corner Bracing	2"x2.5"	Timber	Both top and bottom
9.	Fance (Top)		Bamboo Mat	
10.	Fance (Bottom)	0.25 mm	CGI Sheet	3' height
11.	Interior Post	3" dia	Bamboo	With <i>Katla</i>
12.	Corner Post	4"x4"x11'-0"	R C	4-8 mm Ø 1:2:4 Concrete
13.	Fance Supporting Post	2" dia	Bamboo	Without <i>Katla</i>
14.	Door	3'-0"x6'-0"	Timber	Position may be changed
15.	Window	2'-7"x3"-6"	Timber	Position may be changed

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: GIDARI, GAIBANDHA

TYPE: 02

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain  
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

MEMBER SCHEDULE

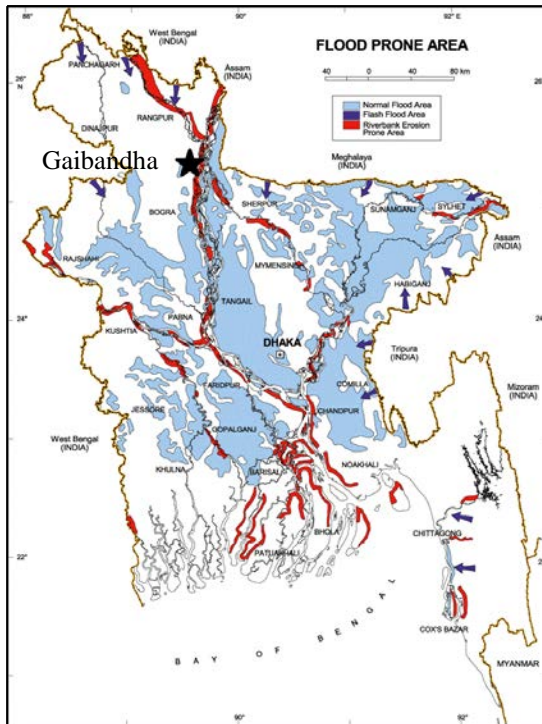
JULY, 2015

SHEET NO:

S - 06

## DIVISION: RANGPUR

### 33. DESIGN OF LCH IN GAIBANDHA: TYPE – DP 1



#### SITE TOPOGRAPHY



#### General Information:

##### Location:

District: Gaibandha  
Upazila: Gaibandha Sadar  
Union: Gidari  
Mouza/ Village: South Gidari

##### Climatic Feature:

Avg. Maximum Temperature: 33.5 °C  
Avg. Minimum temperature: 10.5°C  
Annual Rainfall: 2536 mm  
Average Relative Humidity: 77%

##### Geotechnical Feature:

Topography: Flat land near river bank, char land  
MSL: 21 m  
Soil Characteristics: Coarse Sand

##### Disaster:

Flood, river bank erosion, northwester/tornado



Completed House

#### Design Considerations:

Available Building Materials: Mud, Bamboo, Jute ropes, jute stick, *batha* plant, RC post, CGI sheets, Straw, Wood etc.

Foundation: Wooden/ Bamboo posts (*katla*) embedded in soil (1-2 ft)

Plinth: Mud (two/three steps)

Post: Bamboo and RC posts

Fence/Wall: CGI sheet and bamboo mat (3 parts)

Openings: 1 main door + 1 inside door to connect rooms

Treatment (bamboo & wood): Water treatment & partial chemical treatment

Roof Type: Four pitched

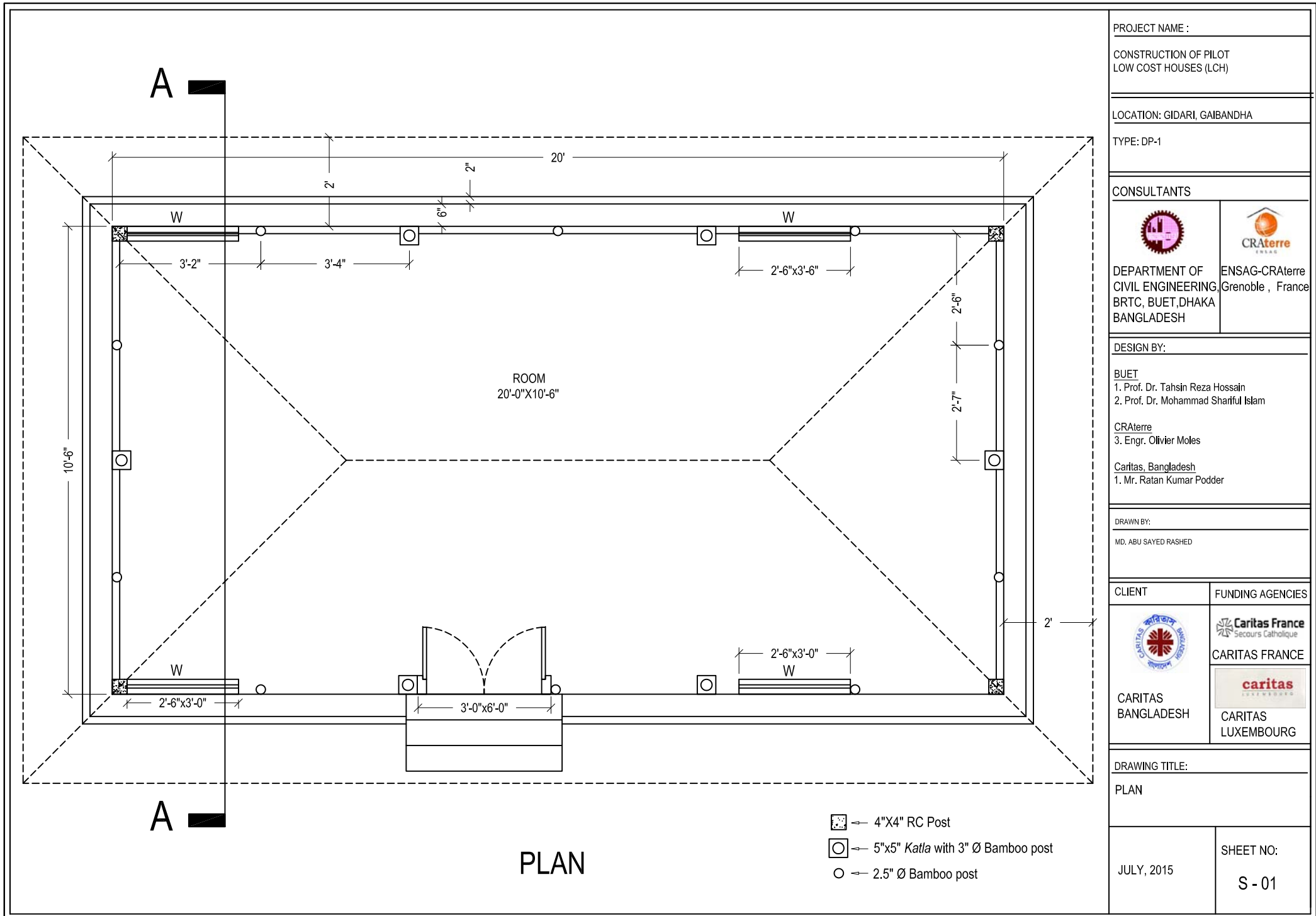
Roof cover: CGI sheets

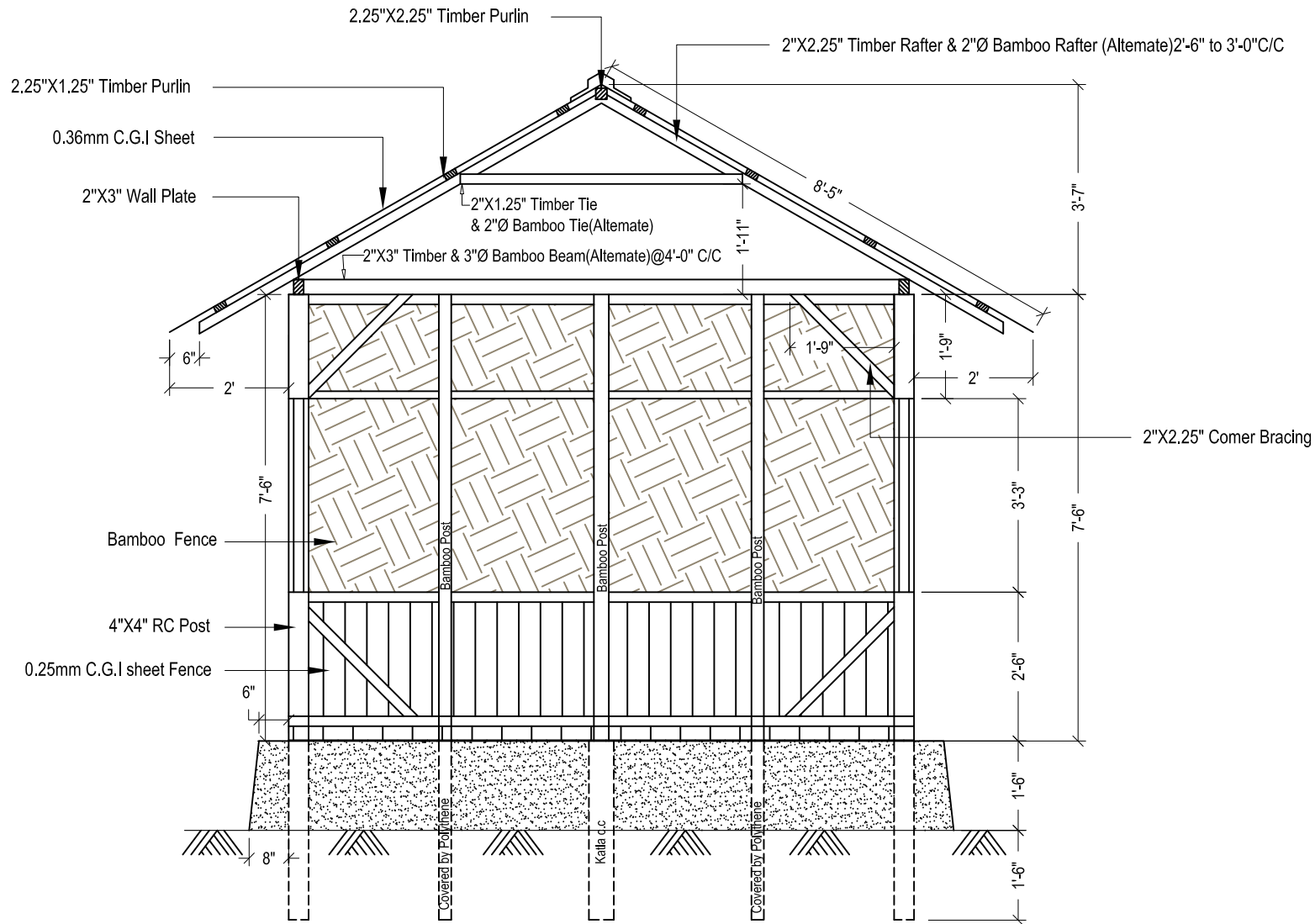
Roof structure: Wooden/ bamboo truss

Bracing: Corner bracing

Joints: Nails, notches, GI wire

Cost: Tk. 75,000





SECTION : A - A

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: GIDARI, GAIBANDHA

TYPE: DP-1

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

CARITAS  
BANGLADESH

FUNDING AGENCIES



CARITAS FRANCE

CARITAS  
LUXEMBOURG

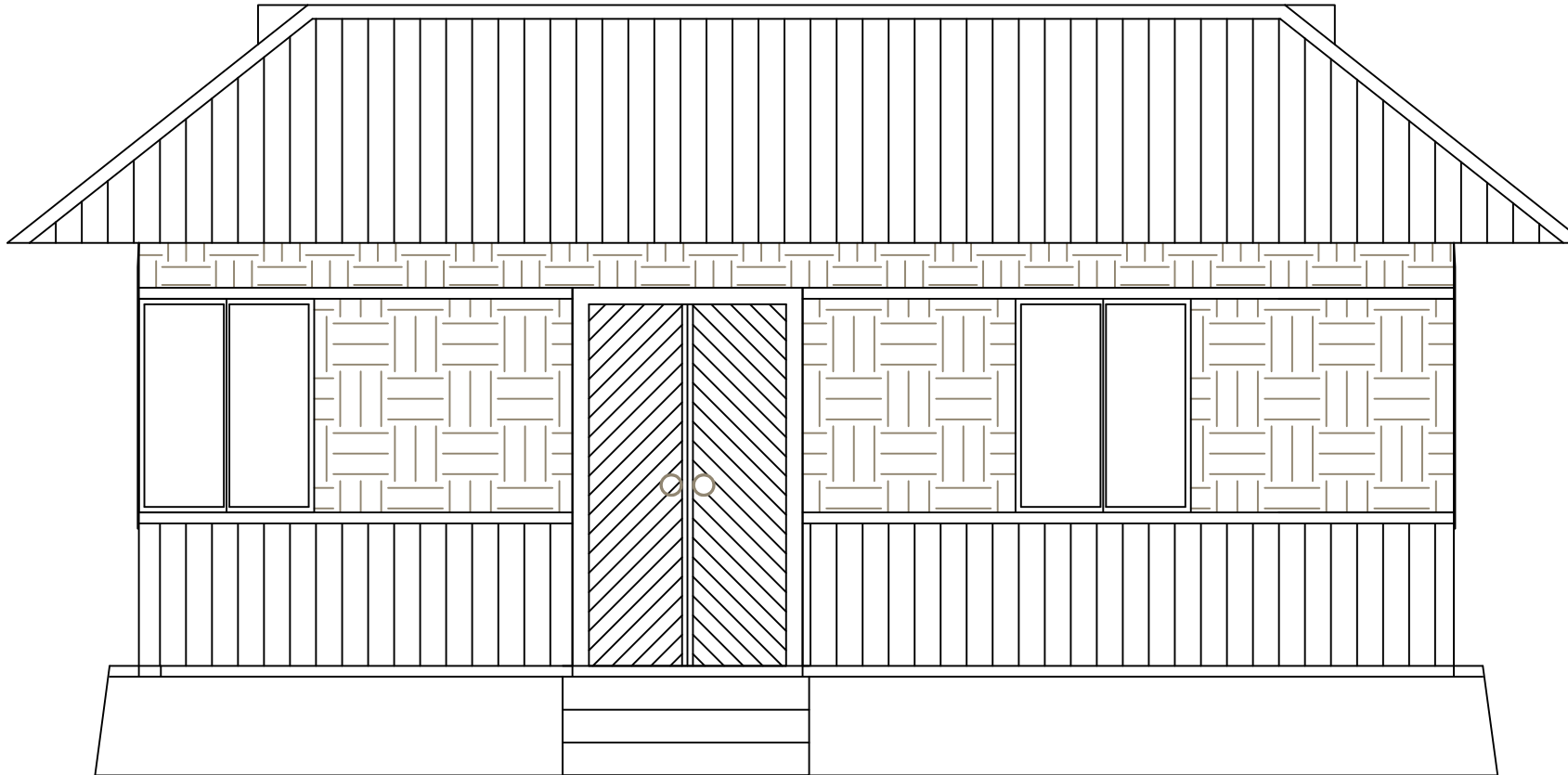
DRAWING TITLE:

SECTION-XX

JULY, 2015

SHEET NO:

S - 02



FRONT ELEVATION

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: GIDARI, GAIBANDHA

TYPE: DP-1

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

CARITAS  
BANGLADESH

FUNDING AGENCIES



CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

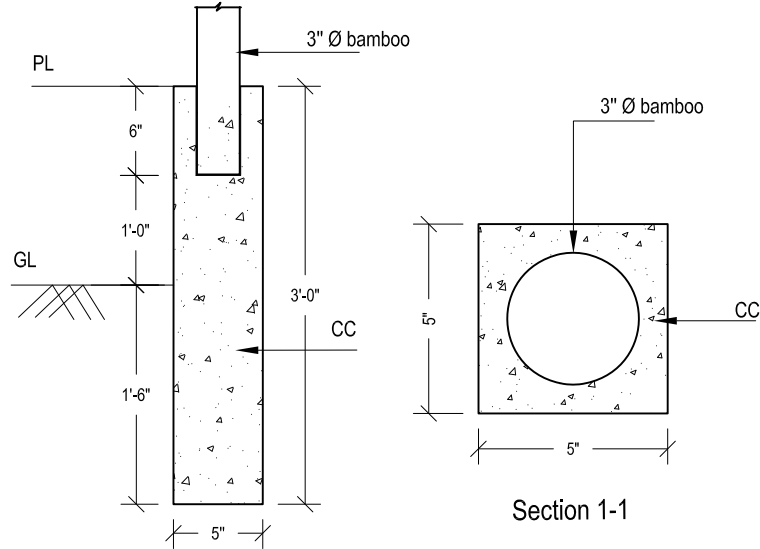
FRONT ELEVATION

JULY, 2015

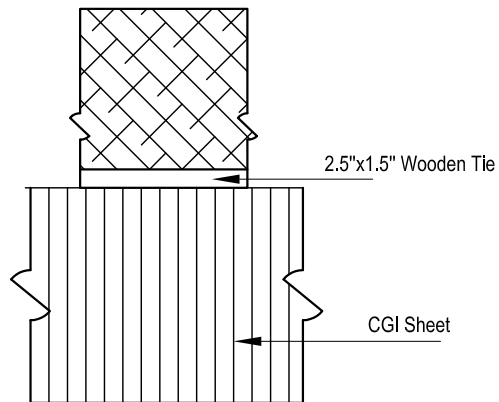
SHEET NO:

S - 03

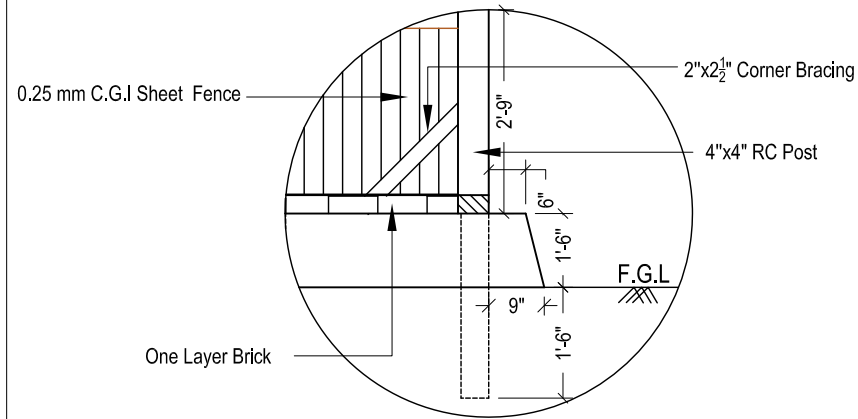




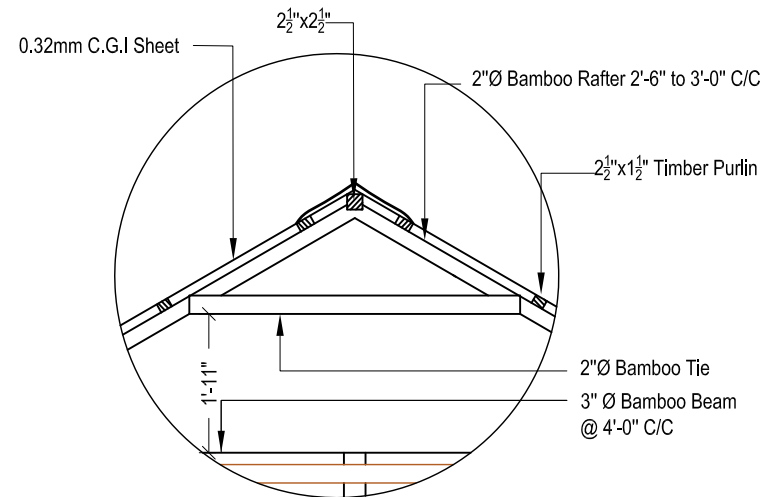
Detail 01: Bamboo into C C Katla



Detail 02: CGI Sheet &amp; Bamboo Fence Joint



Detail 03: Plinth



Detail 04: Roof Top

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: GIDARI, GAIBANDHA

TYPE: DP-1

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

CARITAS  
BANGLADESH

FUNDING AGENCIES



CARITAS FRANCE

CARITAS  
LUXEMBOURG

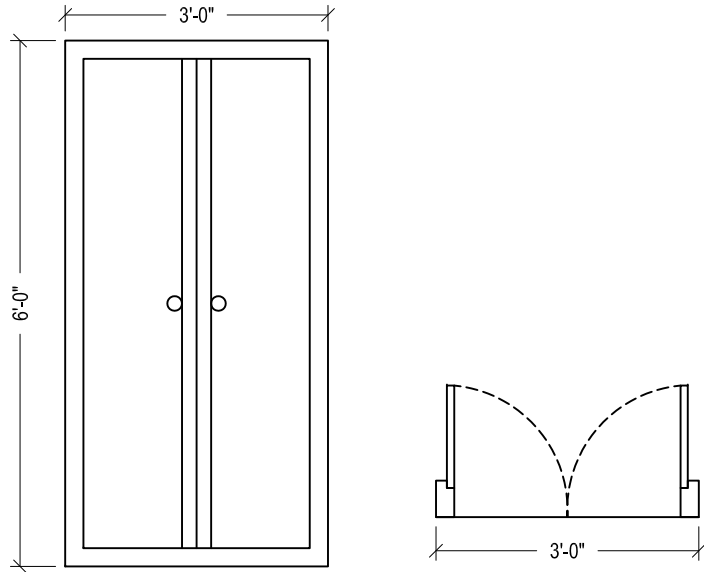
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DETAILS

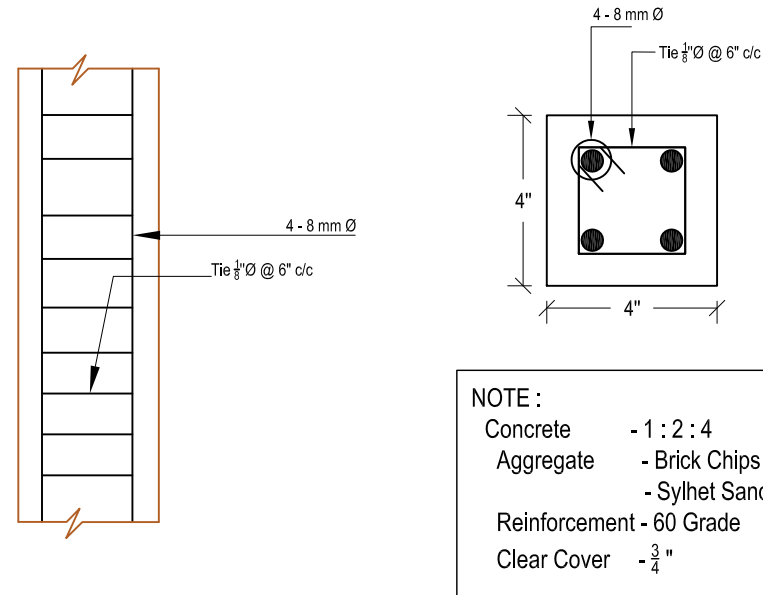
JULY, 2015

SHEET NO:

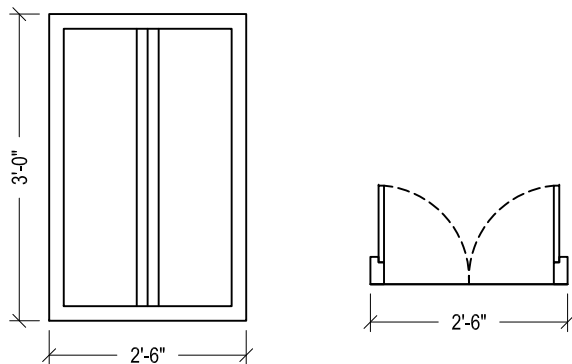
S - 04



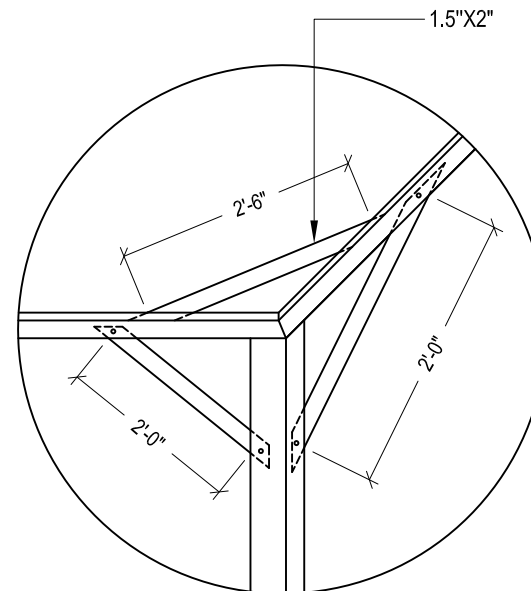
Detail 05: Door



Detail 07: RC Post (Long Section &amp; Cross Section)



Detail 06: Window



Detail 08: Corner Bracing

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: GIDARI, GAIBANDHA

TYPE: DP-1

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain  
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

CARITAS  
BANGLADESH

FUNDING AGENCIES



CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

DETAILS

JULY, 2015

SHEET NO:

S - 05

MEMBER SCHEDULE				
SL.	ITEMS NAME	DIMENSIONS	MATERIALS NAME	REMARKS
1.	Roof Cover	0.32 mm	CGI Sheet	
2.	Purlin	2"x1.5"	Timber	@ 2'-6" C/C
3.	Rafter	2" to 2.5" dia	Bamboo	@ 2'-6" TO 3'-6" C/C
4.	Center Rafter	2"x2.5"	Timber	
5.	Tie	2"x1.5" Timber & 2" dia bamboo	Timber & Bamboo	@ 3'-0" to 4'-0" C/C (Alternate)
6.	Roof Beam	2.5"x3.5" Timber & 3" dia bamboo	Timber & Bamboo	@ 4'-0" C/C (Alternate)
7.	Wall Plate	2"x3"	Timber	
8.	Corner Bracing	2"x2.5"	Timber	Both top and bottom
9.	Fance (Top)		Bamboo Mat	
10.	Fance (Bottom)	0.25 mm	CGI Sheet	3' height
11.	Interior Post	3" dia	Bamboo	With <i>Katla</i>
12.	Corner Post	4"x4"x11'-0"	R C	4-8 mm Ø 1:2:4 Concrete
13.	Fance Supporting Post	2" dia	Bamboo	Without <i>Katla</i>
14.	Door	3'-0"x6'-0"	Timber	Position may be changed
15.	Window	2'-6"x3'-0"	Timber	Position may be changed

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: GIDARI, GAIBANDHA

TYPE: DP-1

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain  
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

MEMBER SCHEDULE

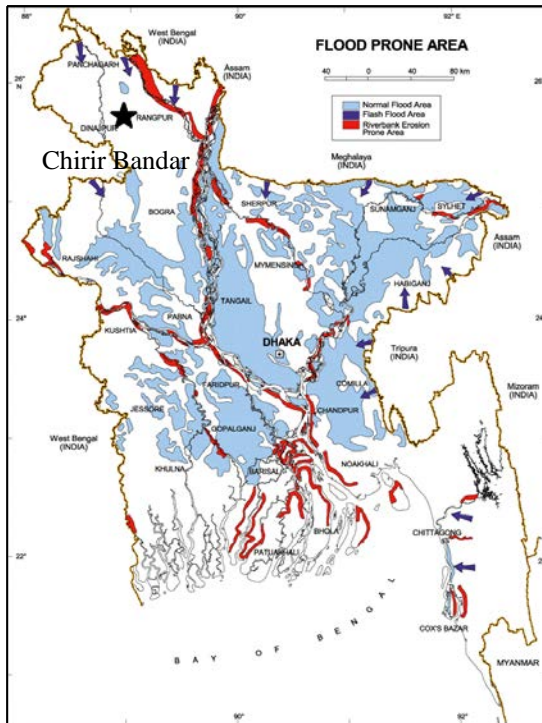
JULY, 2015

SHEET NO:

S - 06

## DIVISION: RANGPUR

### 34. DESIGN OF LCH IN CHIRIR BANDAR: TYPE – DP 2



Chirir Bandar

FLOOD PRONE AREA

#### SITE TOPOGRAPHY



#### General Information:

##### Location:

District: Dinajpur

Upazila: Chirir Bandar

Union: Viail

Mouza/ Village: Gorgora

##### Climatic Feature: Dry and cold

Avg. Maximum Temperature: 33.5 °C

Avg. Minimum temperature: 10.5°C

Annual Rainfall: 2536 mm

Average Relative Humidity: 77%

##### Geotechnical Feature:

Topography: Flat land near river bank, char land

MSL: 28 m

Soil Characteristics: Coarse Sand

Disaster: Flood, river bank erosion, northwester/tornado



Completed House

#### Design Considerations:

Available Building Materials: Mud, Bamboo, Jute ropes, jute stick, *batha* plant, RC post, CGI sheets, Straw, Wood etc.

Foundation: Wooden/ Bamboo posts (*katla*) embedded in soil (1-2 ft) Roof Type: Four pitched

Plinth: Mud (two/three steps)

Roof cover: CGI sheets

Post: Bamboo and RC posts

Roof structure: Wooden/ bamboo truss

Fence/Wall: *Tati* (made of bamboo branch/slice and mud plaster)

Bracing: Corner bracing

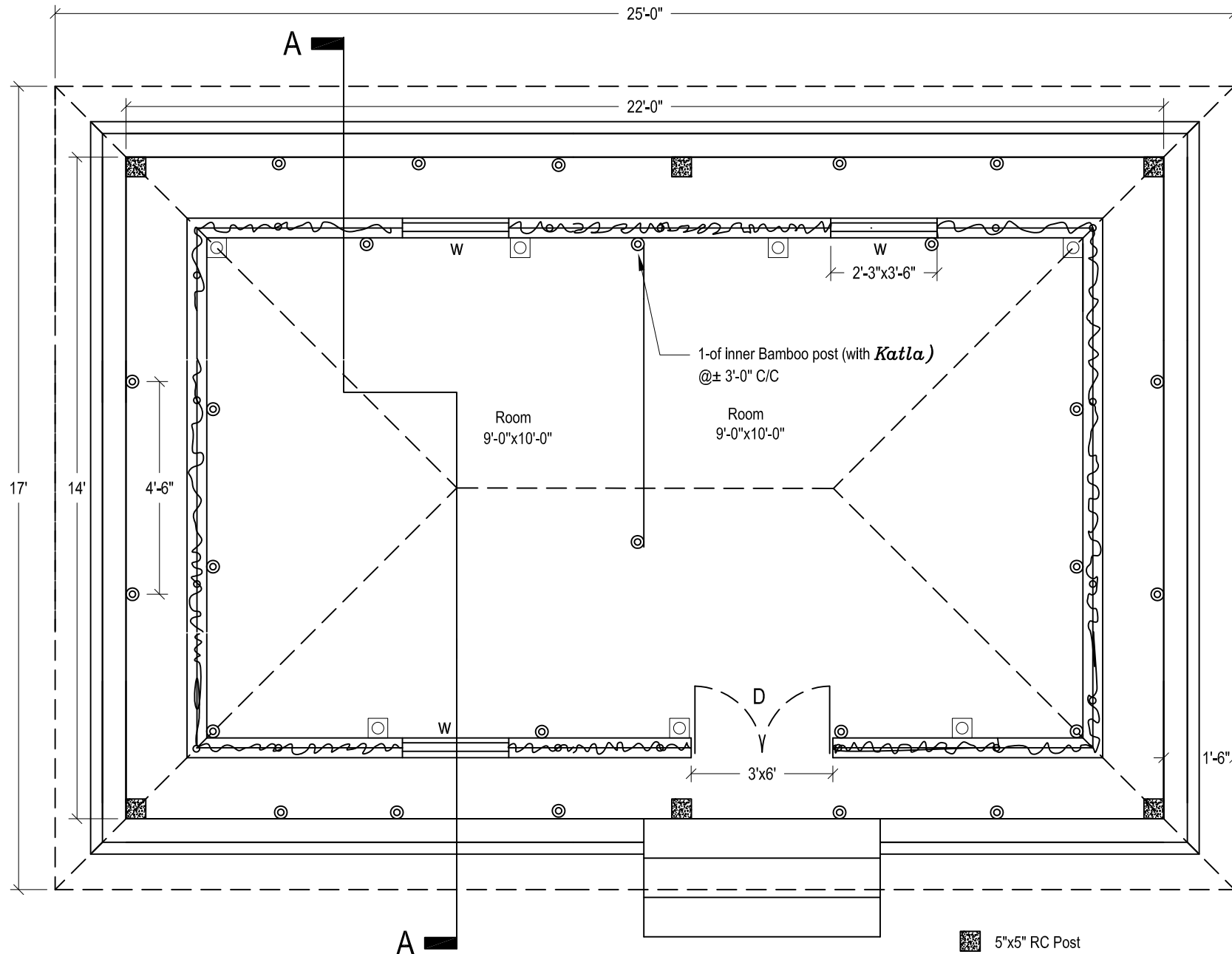
Openings: 1 main door

Joints: Nails, notches, GI wire

Ceiling: Ceiling is considered to protect heat and cold






Cost: Tk. 75,000

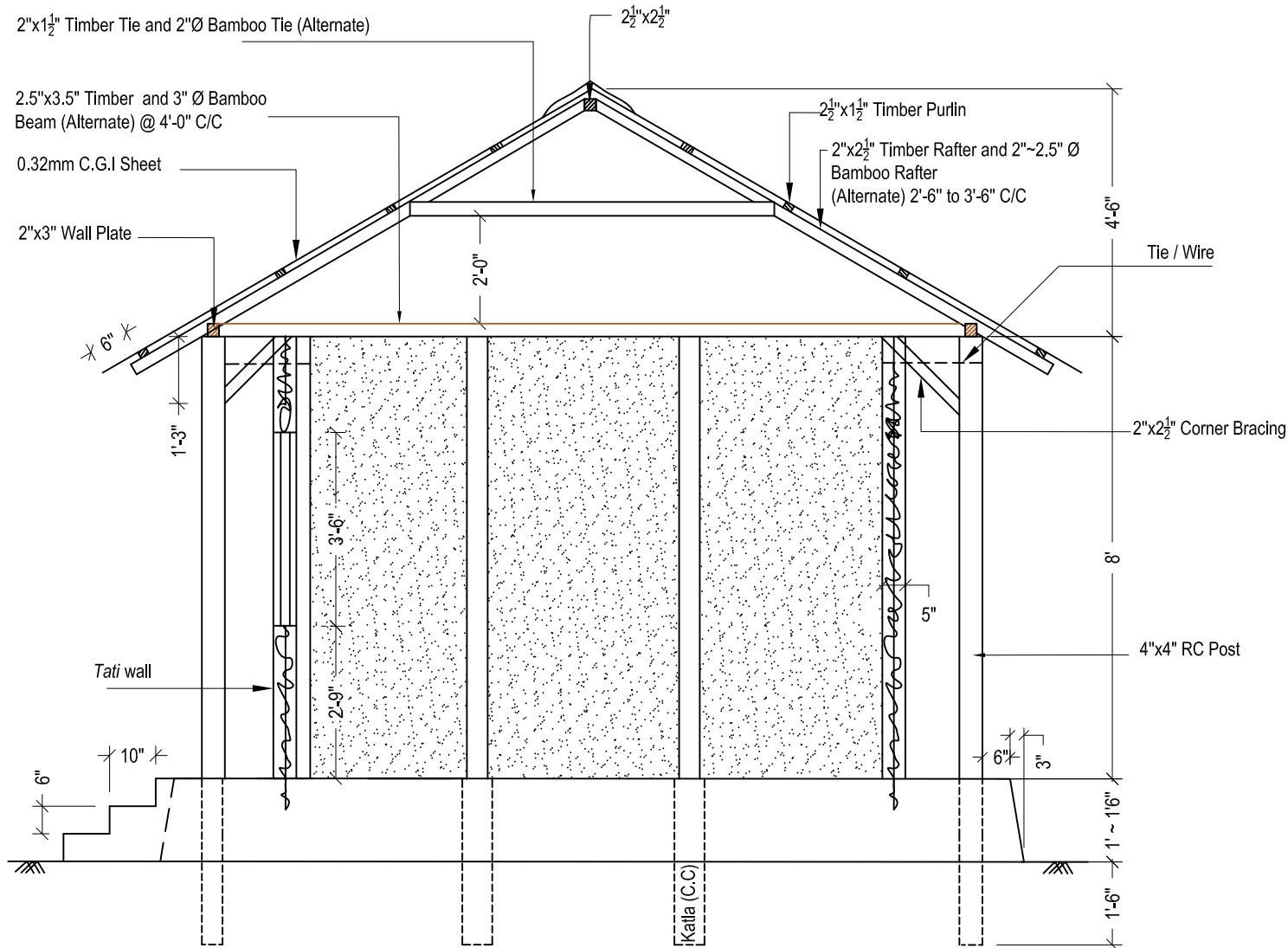
Treatment (bamboo & wood): Water treatment & partial chemical treatment



PLAN

- 5"x5" RC Post
- 5"x5" *Katla* with Ø3" bamboo post
- ◎ Ø3" Bamboo post with *Katla*

PROJECT NAME :	
CONSTRUCTION OF PILOT LOW COST HOUSES (LCH)	
LOCATION: CHIRIR BANDAR, DINAJPUR	
TYPE - DP-2 : Tati house with CGI sheet roof	
CONSULTANTS	
 <p>DEPARTMENT OF CIVIL ENGINEERING, BRTC, BUET, DHAKA, BANGLADESH</p>	 <p>ENSAG-CRATERRE Grenoble, France</p>
DESIGN BY:	
BUET 1. Prof. Dr. Tahsin Reza Hossain 2. Prof. Dr. Mohammad Shariful Islam	
CRATERRE 3. Engr. Olivier Moles	
Caritas, Bangladesh 1. Mr. Ratan Kumar Podder	
DRAWN BY:	
MD. ABU SAYED RASHED	
CLIENT	FUNDING AGENCIES
 <p>CARITAS BANGLADESH</p>	 <p>CARITAS FRANCE</p>
	 <p>CARITAS LUXEMBOURG</p>
DRAWING TITLE:	
PLAN	
JULY, 2015	SHEET NO: S - 01



SECTION: A-A

PROJECT NAME :

## CONSTRUCTION OF PILOT LOW COST HOUSES (LCH)

LOCATION: CHIRIR BANDAR, DINAJPUR

TYPE - DP-2 : Tati house with CGI sheet roof

CONSULTANTS



DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESH



ENSAG-CRAterre  
Grenoble, France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES
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CARITAS  
BANGLADESH

CARITAS FRANCE



CARITAS  
LUXEMBOURG

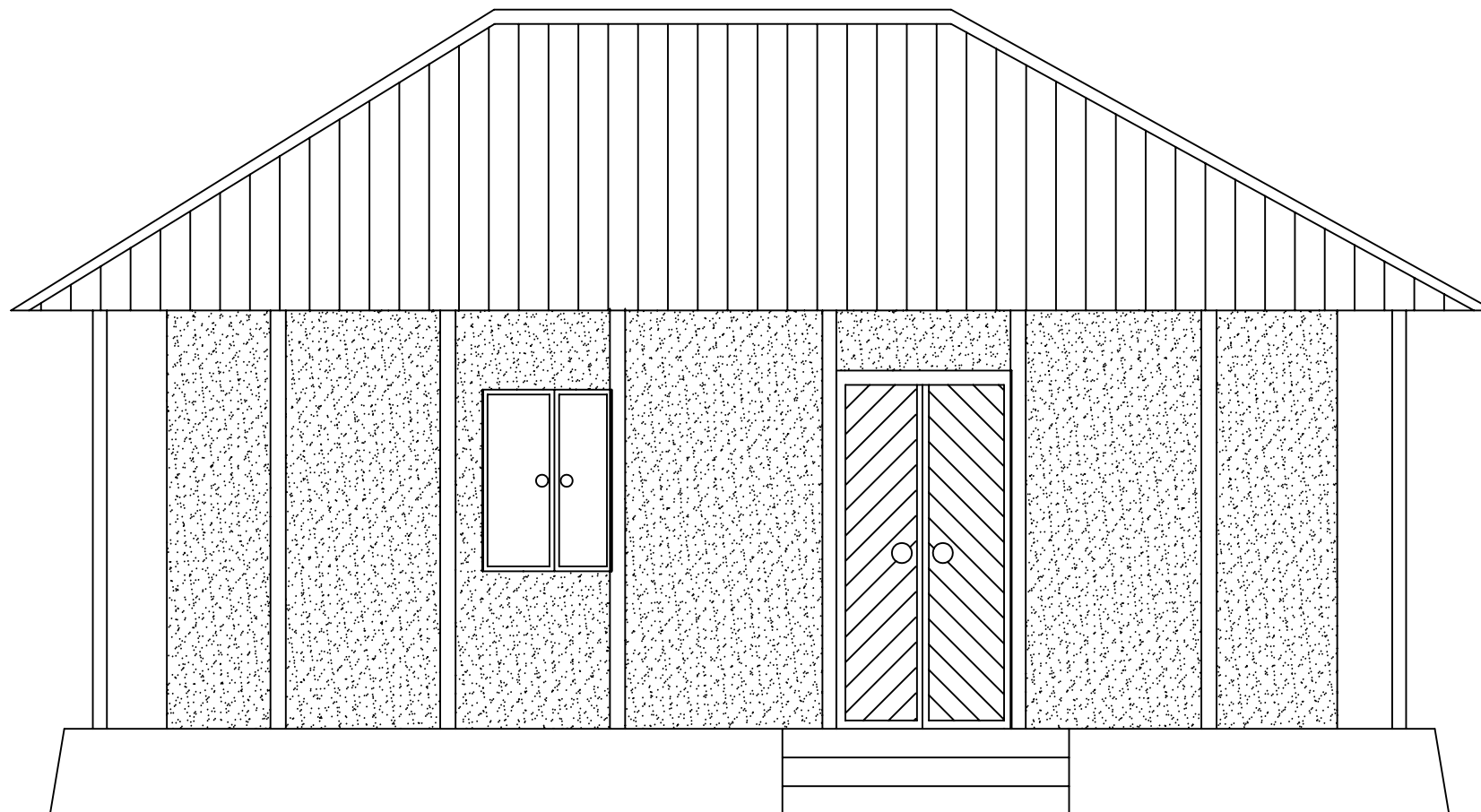
DRAWING TITLE:

SECTION: A-A

JULY, 2015

SHEET NO:

S - 02



FRONT ELEVATION

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: CHIRIR BANDAR, DINAJPUR

TYPE - DP-2 : Tati house with CGI sheet roof

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

1. Prof. Dr. Tahsin Reza Hossain
2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

FRONT ELEVATION

JULY, 2015

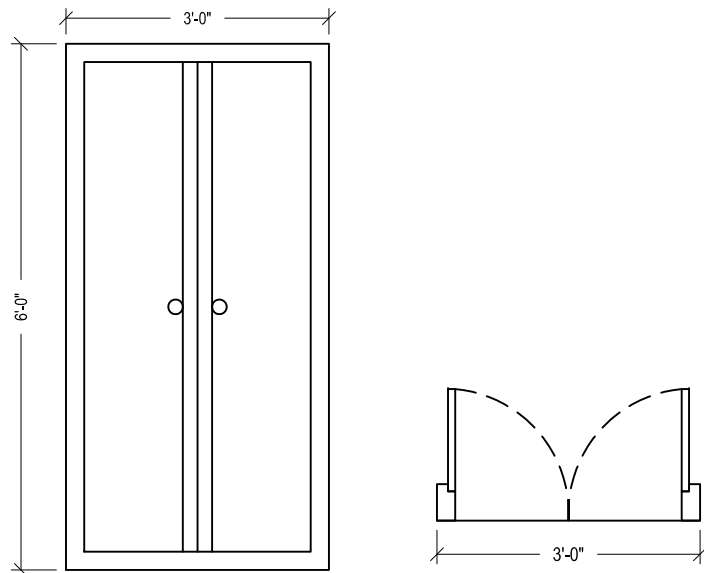
SHEET NO:

S - 03

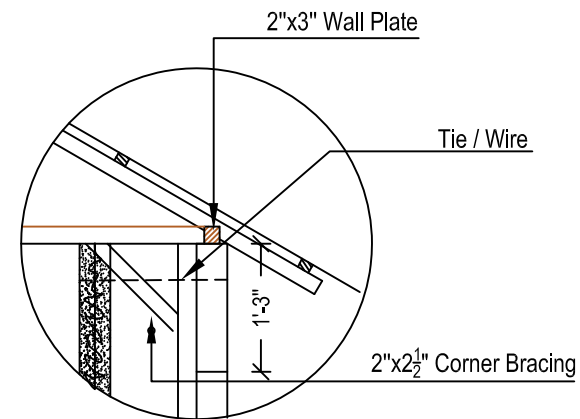




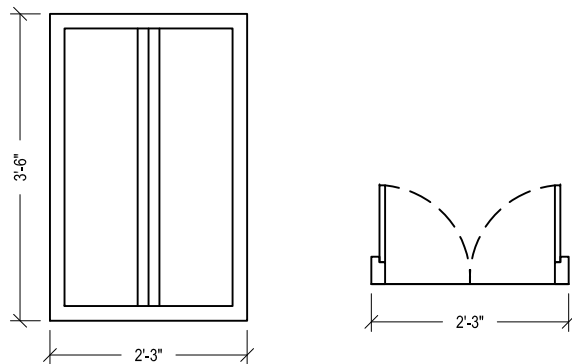




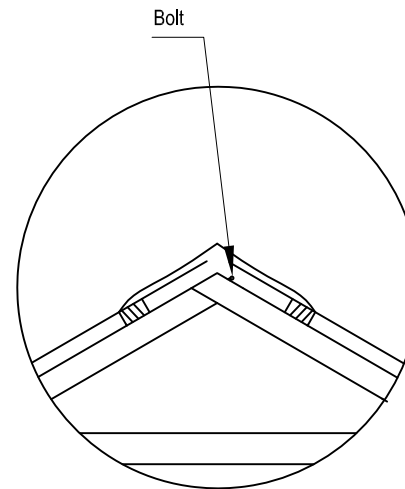
Detail 05: Door



Detail 07: Corner Bracing and Roof Arrangement



Detail 06: Window



Detail 08: Roof Top

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: CHIRIR BANDAR, DINAJPUR

TYPE - DP-2 : Tati house with CGI sheet roof

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

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2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

CARITAS  
BANGLADESH

FUNDING AGENCIES



CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

DETAILS

JULY, 2015

SHEET NO:

S - 05

MEMBER SCHEDULE				
SL.	ITEMS NAME	DIMENSIONS	MATERIALS NAME	REMARKS
1.	Roof Cover	0.32 mm	CGI Sheet	
2.	Purlin	2"x1.5"	Timber	@ 2'-6" C/C
3.	Rafter	2" to 2.5" dia	Bamboo	@ 2'-6" TO 3'-6" C/C
4.	Center Rafter	2"x2.5"	Timber	
5.	Tie	2"x1.5" Timber & 2" dia bamboo	Timber & Bamboo	@ 3'-0" to 4'-0" C/C (Alternate)
6.	Roof Beam	2.5"x3.5" Timber & 3" dia bamboo	Timber & Bamboo	@ 4'-0" C/C (Alternate)
7.	Wall Plate	2"x3"	Timber	
8.	Corner Bracing	2"x2.5"	Timber	Both top and bottom
9.	Fance (Top)		Bamboo Mat	
10.	Fance (Bottom)	0.25 mm	CGI Sheet	3' height
11.	Interior Post	3" dia	Bamboo	With <i>Katla</i>
12.	Corner Post	4"x4"x11'-0"	R C	4-8 mm Ø 1:2:4 Concrete
13.	Fance Supporting Post	2" dia	Bamboo	Without <i>Katla</i>
14.	Door	3'-0"x6'-0"	Timber	Position may be changed
15.	Window	2'-7"x3"-6"	Timber	Position may be changed

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: CHIRIR BANDAR, DINAJPUR

TYPE - DP-2 : Tati house with CGI sheet roof

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

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2. Prof. Dr. Mohammad Shariful Islam

CRAAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXENBOURG

DRAWING TITLE:

MEMBER SCHEDULE

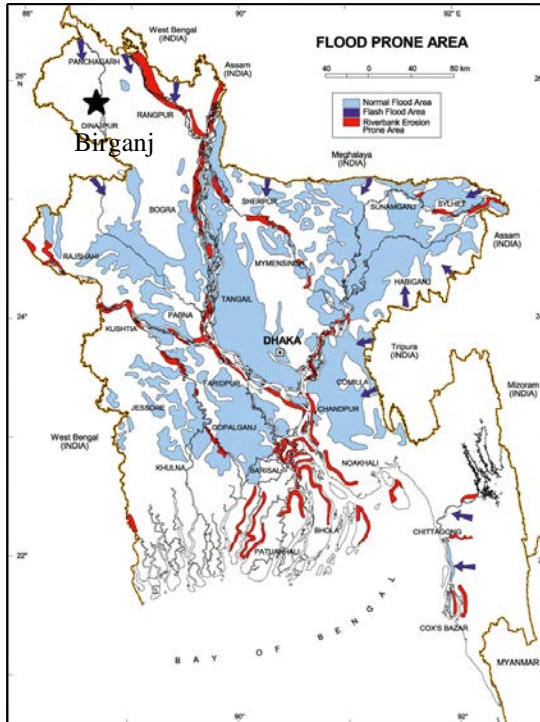
JULY, 2015

SHEET NO:

S - 06

## DIVISION: RANGPUR

### 35. DESIGN OF LCH IN BIRGANJ: TYPE – DP 3



#### SITE TOPOGRAPHY



#### General Information:

##### Location:

District: Dinajpur

Upazila: Birganj

Union: Viail

Mouza/ Village: Gorgora

##### Climatic Feature: Dry and cold

Avg. Maximum Temperature: 33 °C

Avg. Minimum temperature: 14°C

Annual Rainfall: 3334 mm

Average Relative Humidity: 76%

##### Geotechnical Feature:

Topography: Flat land near river bank, char land

MSL: 3 m

Soil Characteristics: Coarse Sand

##### Disaster:

Flood, river bank erosion, northwester/tornado



Completed House

#### Design Considerations:

Available Building Materials: Mud, Bamboo, Jute ropes, jute stick, *batha* plant, RC post, CGI sheets, Straw, Wood etc.

Foundation: Wooden/ Bamboo posts (*katla*) embedded in soil (1-2 ft)

Plinth: Mud (two/three steps) height 1'-6"

Post: Bamboo and RC posts

Fence/Wall: Bamboo fence and CGI Sheet

Openings: 1 main door + 1 inside door to connect rooms

Ceiling: Ceiling is considered to protect heat and cold

Treatment (bamboo & wood): Water treatment & partial chemical treatment

Roof Type: Four pitched

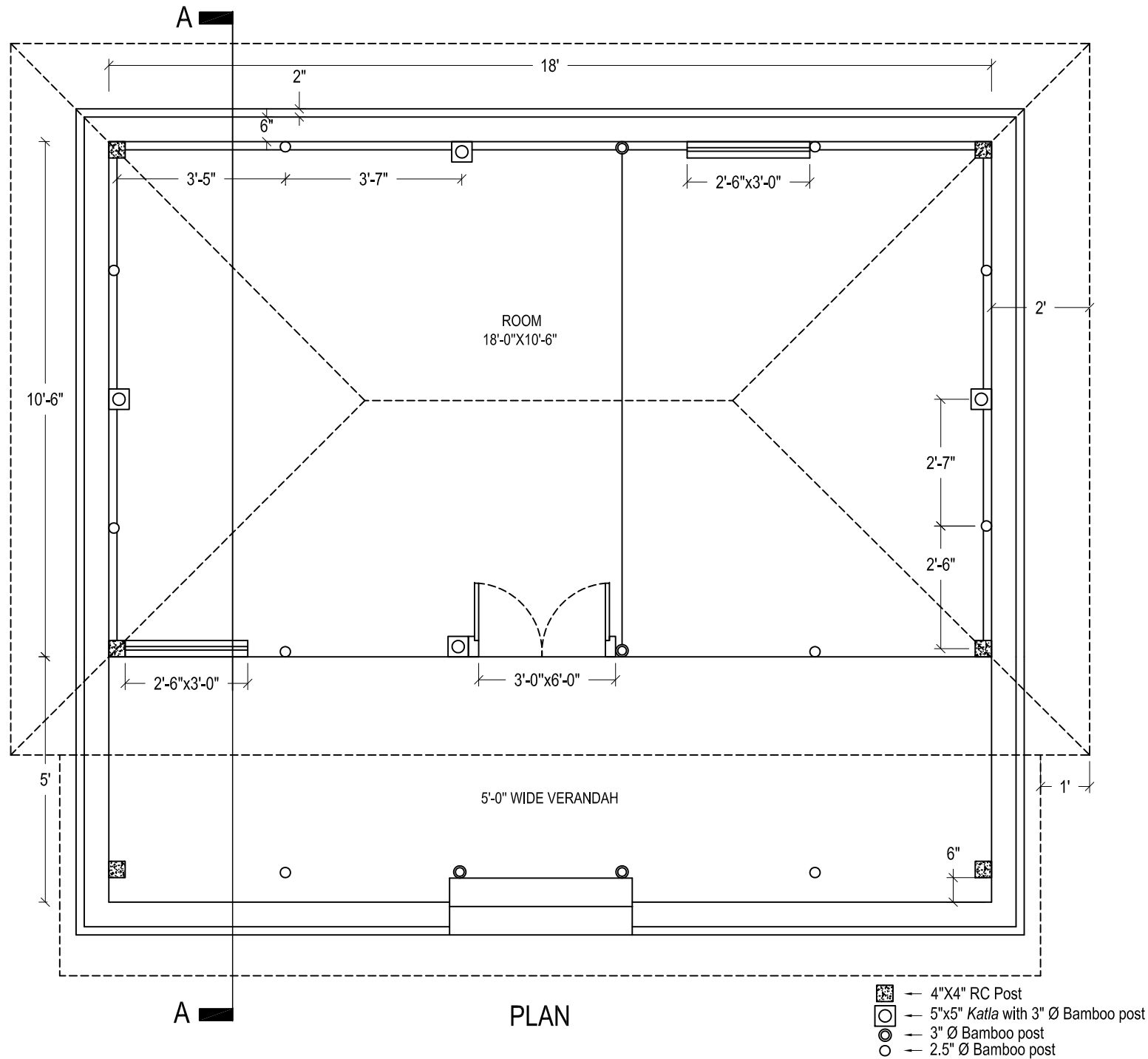
Roof cover: CGI sheets

Roof structure: Wooden/ bamboo truss

Bracing: Corner bracing

Joints: Nails, notches, GI wire

Cost: Tk. 75,000



PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: BIRGONJ, DINAJPUR

TYPE: DP-3

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

BUET

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2. Prof. Dr. Mohammad Shariful Islam

CRAterre

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

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BANGLADESH

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CARITAS  
LUXEMBOURG

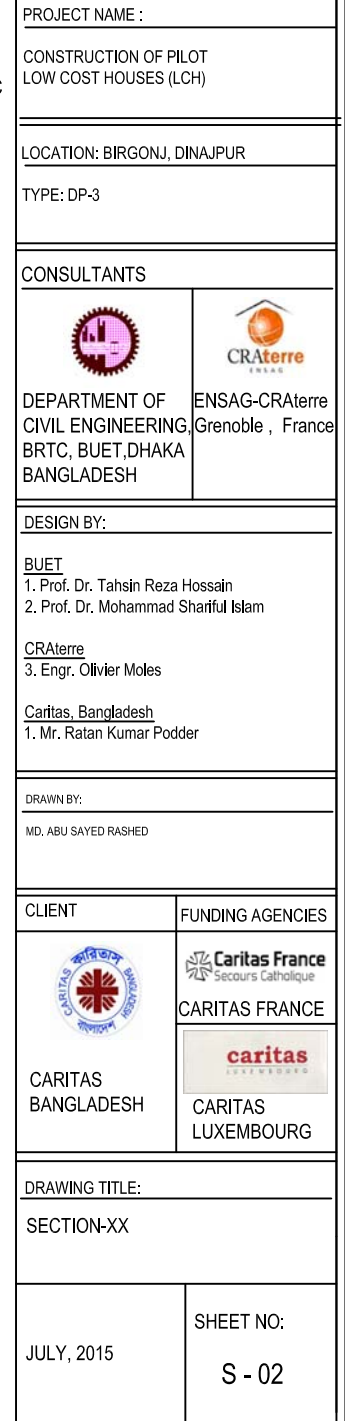
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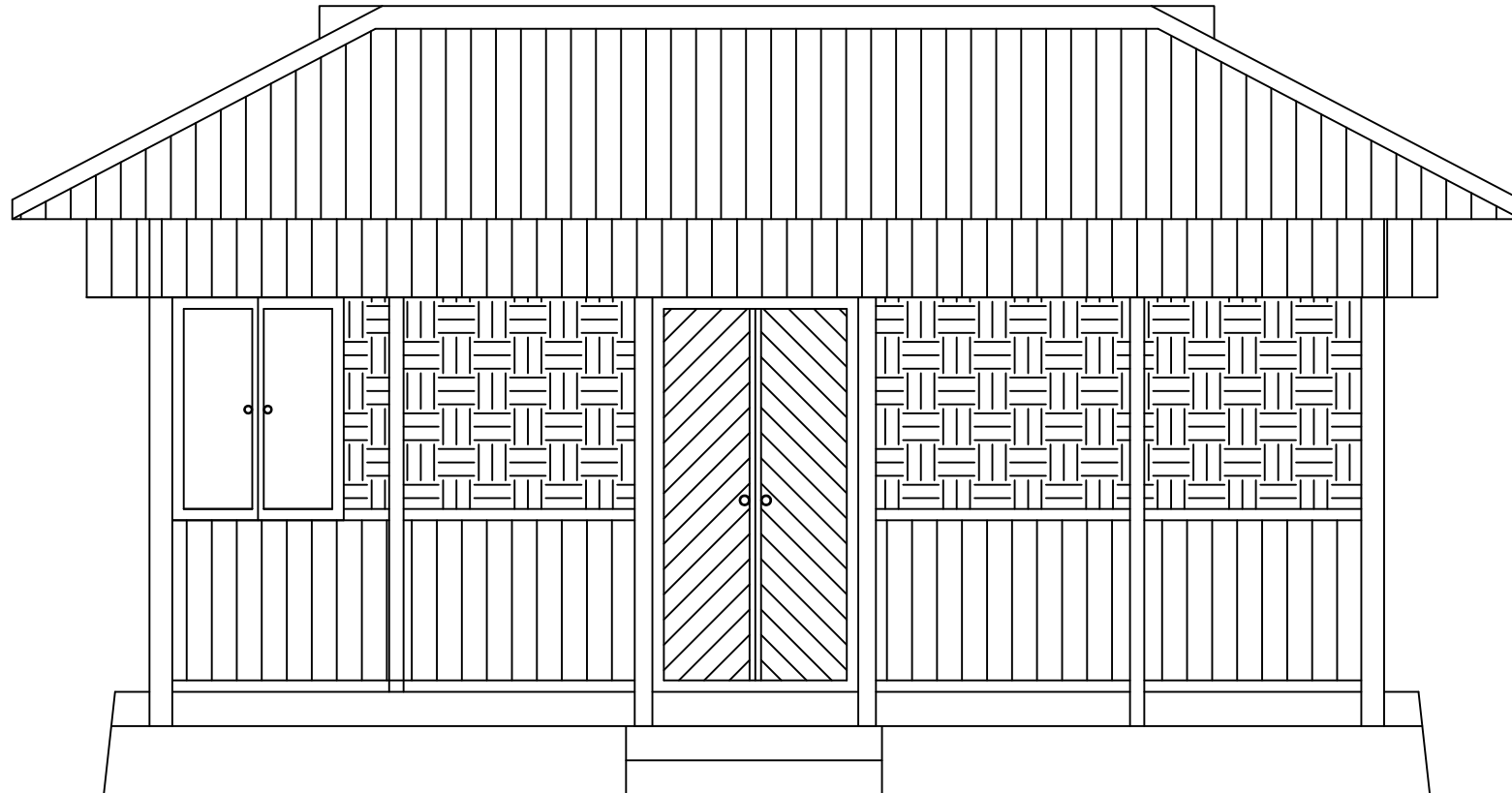
PLAN

JULY, 2015

SHEET NO:

S - 01





FRONT ELEVATION

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: BIRGONJ, DINAJPUR

TYPE: DP-3

## CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

## DESIGN BY:

## BUET

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## CRAterre

3. Engr. Olivier Moles

## Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

## DRAWN BY:

MD. ABU SAYED RASHED

## CLIENT

CARITAS  
BANGLADESH

## FUNDING AGENCIES



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CARITAS  
LUXEMBOURG

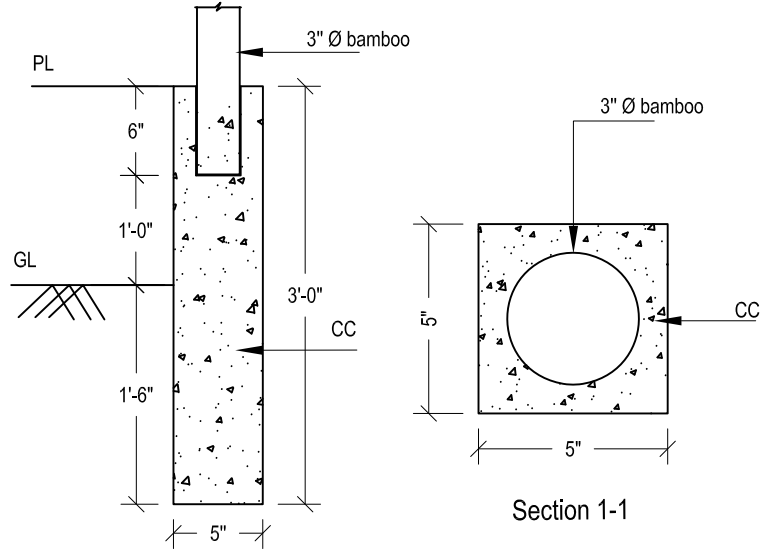
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FRONT ELEVATION

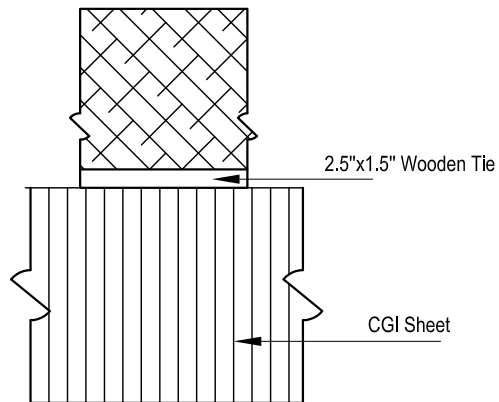
JULY, 2015

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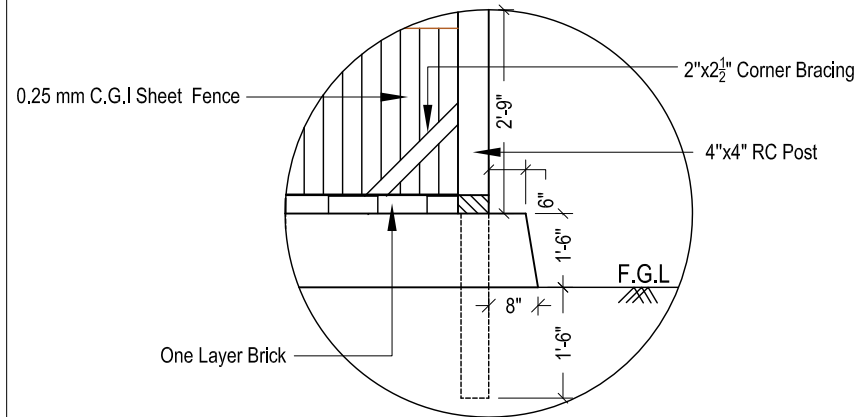
S - 03



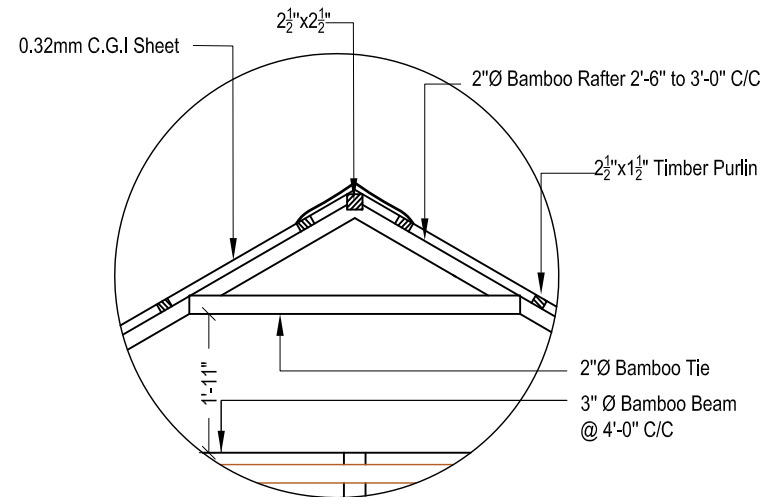
Detail 01: Bamboo into C C Katla



Detail 02: CGI Sheet &amp; Bamboo Fence Joint



Detail 03: Plinth



Detail 04: Roof Top

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: BIRGONJ, DINAJPUR

TYPE: DP-3

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRAterre  
Grenoble , France

DESIGN BY:

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CRAterre

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Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

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CLIENT

CARITAS  
BANGLADESH

FUNDING AGENCIES



CARITAS FRANCE

CARITAS  
LUXEMBOURG

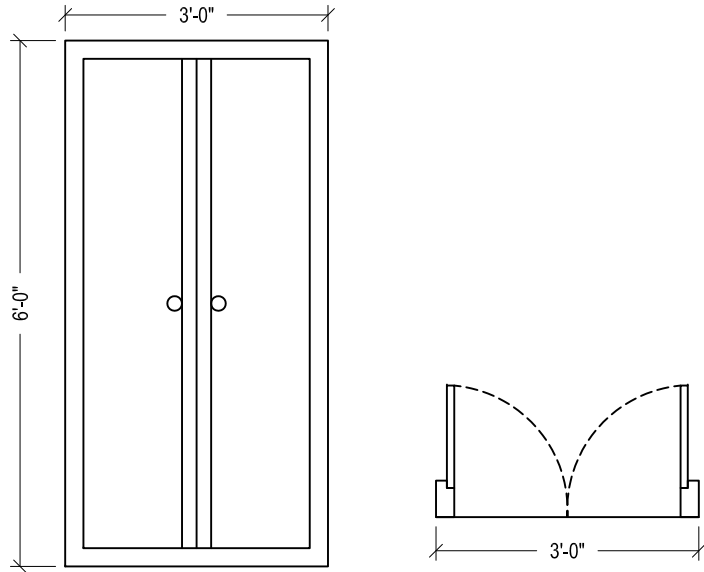
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DETAILS

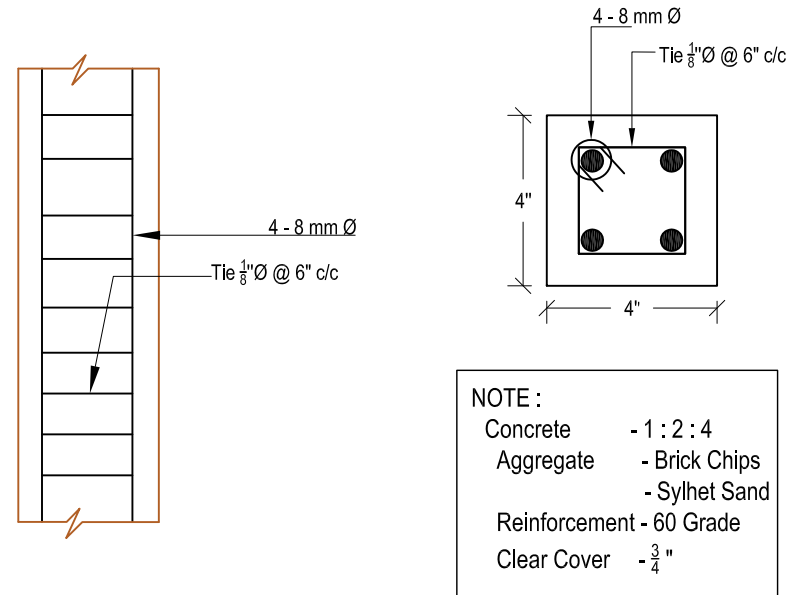
JULY, 2015

SHEET NO:

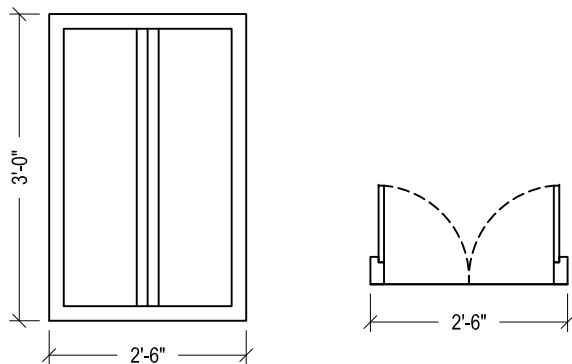
S - 04



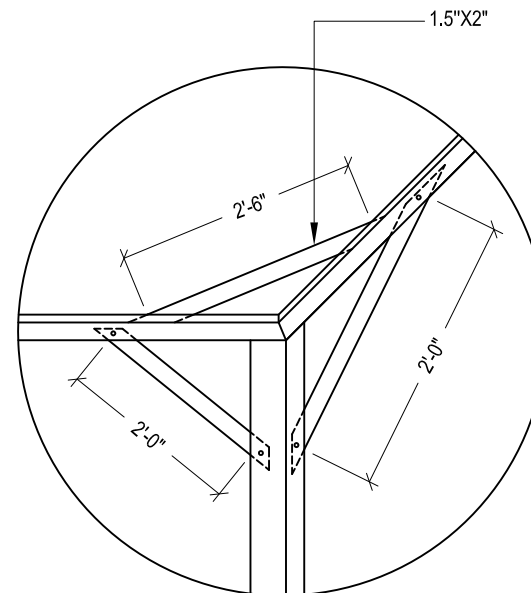
Detail 05: Door








Detail 07: RC Post (Long Section &amp; Cross Section)



Detail 06: Window



Detail 08: Corner Bracing

PROJECT NAME :	
CONSTRUCTION OF PILOT LOW COST HOUSES (LCH)	
LOCATION: BIRGONJ, DINAJPUR	
TYPE: DP-3	
CONSULTANTS	
 <p>DEPARTMENT OF CIVIL ENGINEERING, BRTC, BUET, DHAKA BANGLADESH</p>	 <p>ENSAG-CRAterre Grenoble , France</p>
DESIGN BY:	
BUET 1. Prof. Dr. Tahsin Reza Hossain 2. Prof. Dr. Mohammad Shariful Islam	
CRAterre 3. Engr. Olivier Moles	
Caritas, Bangladesh 1. Mr. Ratan Kumar Podder	
DRAWN BY:	
MD. ABU SAYED RASHED	
CLIENT	FUNDING AGENCIES
 <p>CARITAS BANGLADESH</p>	 <p>CARITAS FRANCE</p>
	 <p>CARITAS LUXEMBOURG</p>
DRAWING TITLE:	
DETAILS	
JULY, 2015	SHEET NO: S - 05



MEMBER SCHEDULE				
SL.	ITEMS NAME	DIMENSIONS	MATERIALS NAME	REMARKS
1.	Roof Cover	0.32 mm	CGI Sheet	
2.	Purlin	2"x1.5"	Timber	@ 2'-6" C/C
3.	Rafter	2" to 2.5" dia	Bamboo	@ 2'-6" TO 3'-6" C/C
4.	Center Rafter	2"x2.5"	Timber	
5.	Tie	2"x1.5" Timber & 2" dia bamboo	Timber & Bamboo	@ 3'-0" to 4'-0" C/C (Alternate)
6.	Roof Beam	2.5"x3.5" Timber & 3" dia bamboo	Timber & Bamboo	@ 4'-0" C/C (Alternate)
7.	Wall Plate	2"x3"	Timber	
8.	Corner Bracing	2"x2.5"	Timber	Both top and bottom
9.	Fance (Top)		Bamboo Mat	
10.	Fance (Bottom)	0.25 mm	CGI Sheet	3' height
11.	Interior Post	3" dia	Bamboo	With <i>Katla</i>
12.	Corner Post	4"x4"x11'-0"	R C	4-8 mm Ø 1:2:4 Concrete
13.	Fance Supporting Post	2" dia	Bamboo	Without <i>Katla</i>
14.	Door	3'-0"x6'-0"	Timber	Position may be changed
15.	Window	2'-6"x3'-0"	Timber	Position may be changed

PROJECT NAME :

CONSTRUCTION OF PILOT  
LOW COST HOUSES (LCH)

LOCATION: BIRGONJ, DINAJPUR

TYPE: DP-3

CONSULTANTS

DEPARTMENT OF  
CIVIL ENGINEERING,  
BRTC, BUET, DHAKA  
BANGLADESHENSAG-CRATERRE  
Grenoble , France

DESIGN BY:

BUET

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CRATERRE

3. Engr. Olivier Moles

Caritas, Bangladesh

1. Mr. Ratan Kumar Podder

DRAWN BY:

MD. ABU SAYED RASHED

CLIENT

FUNDING AGENCIES

CARITAS  
BANGLADESH

CARITAS FRANCE

CARITAS  
LUXEMBOURG

DRAWING TITLE:

MEMBER SCHEDULE

JULY, 2015

SHEET NO:

S - 06